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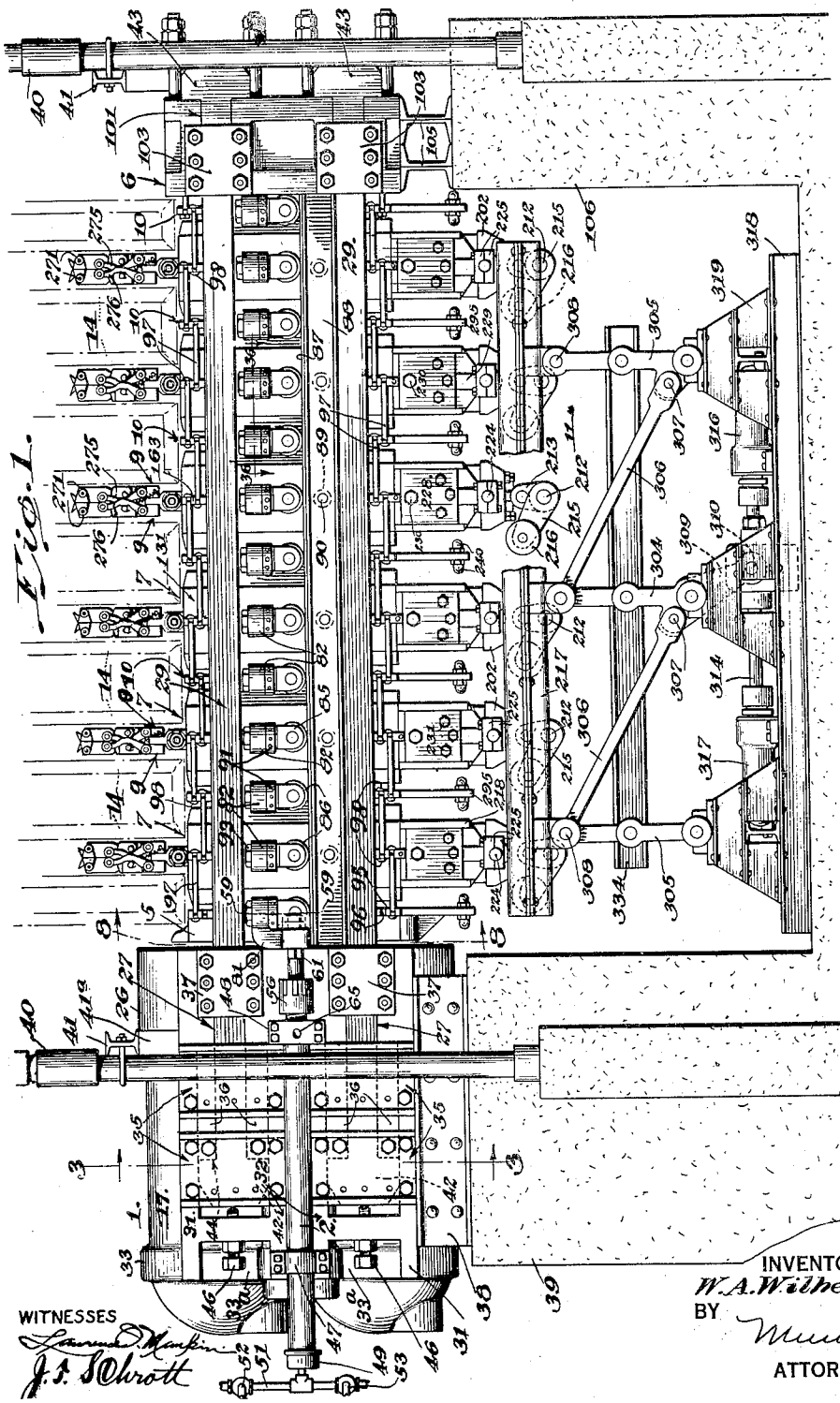


Fig. 1.

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Fig. 2.

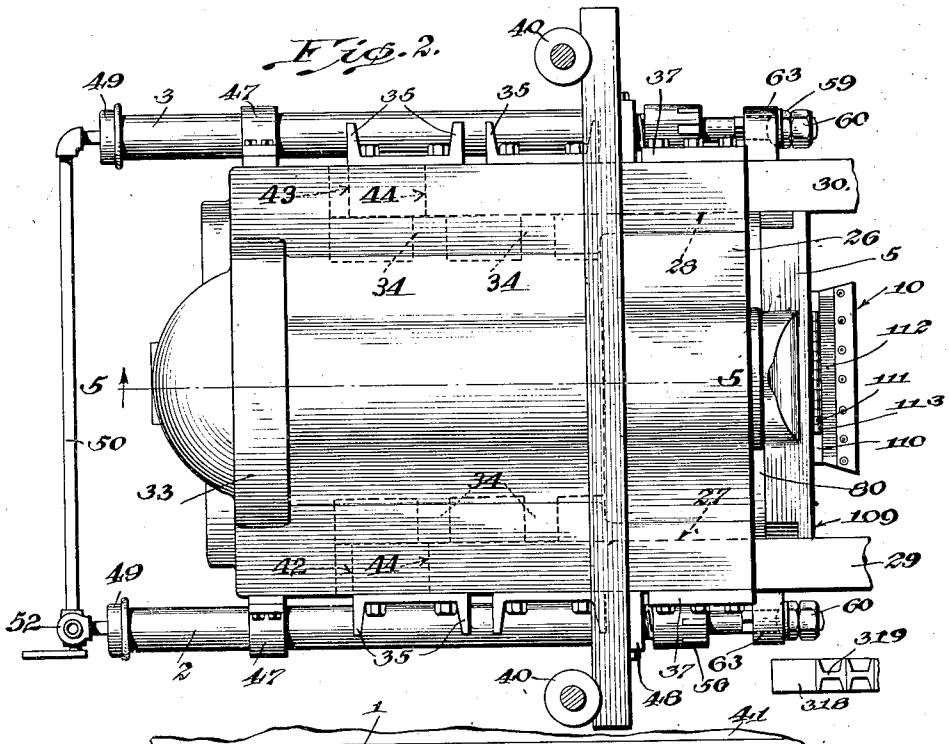
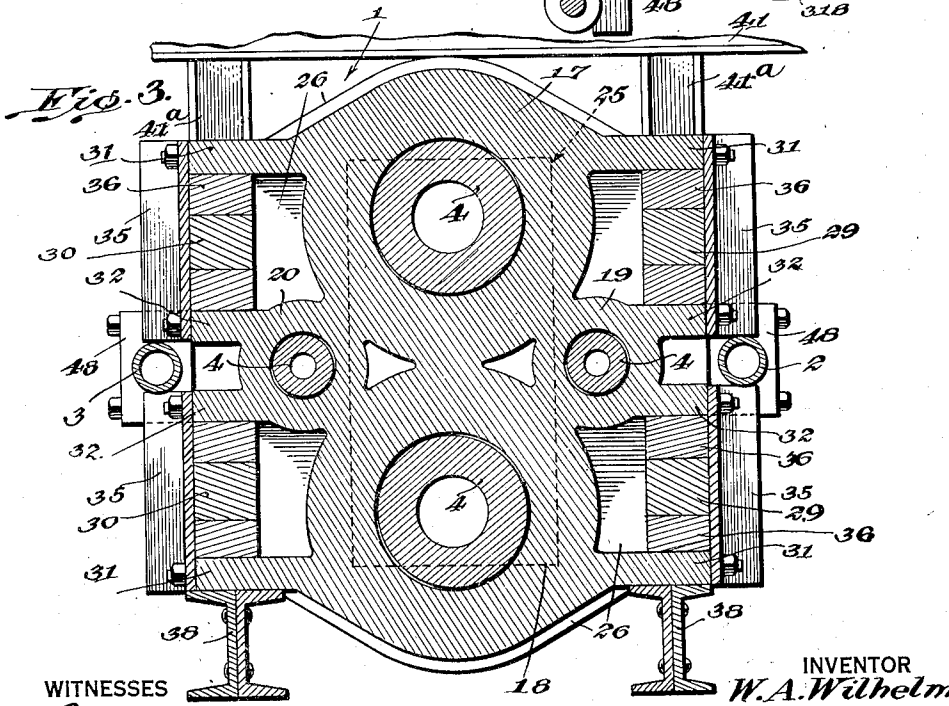


Fig. 3.



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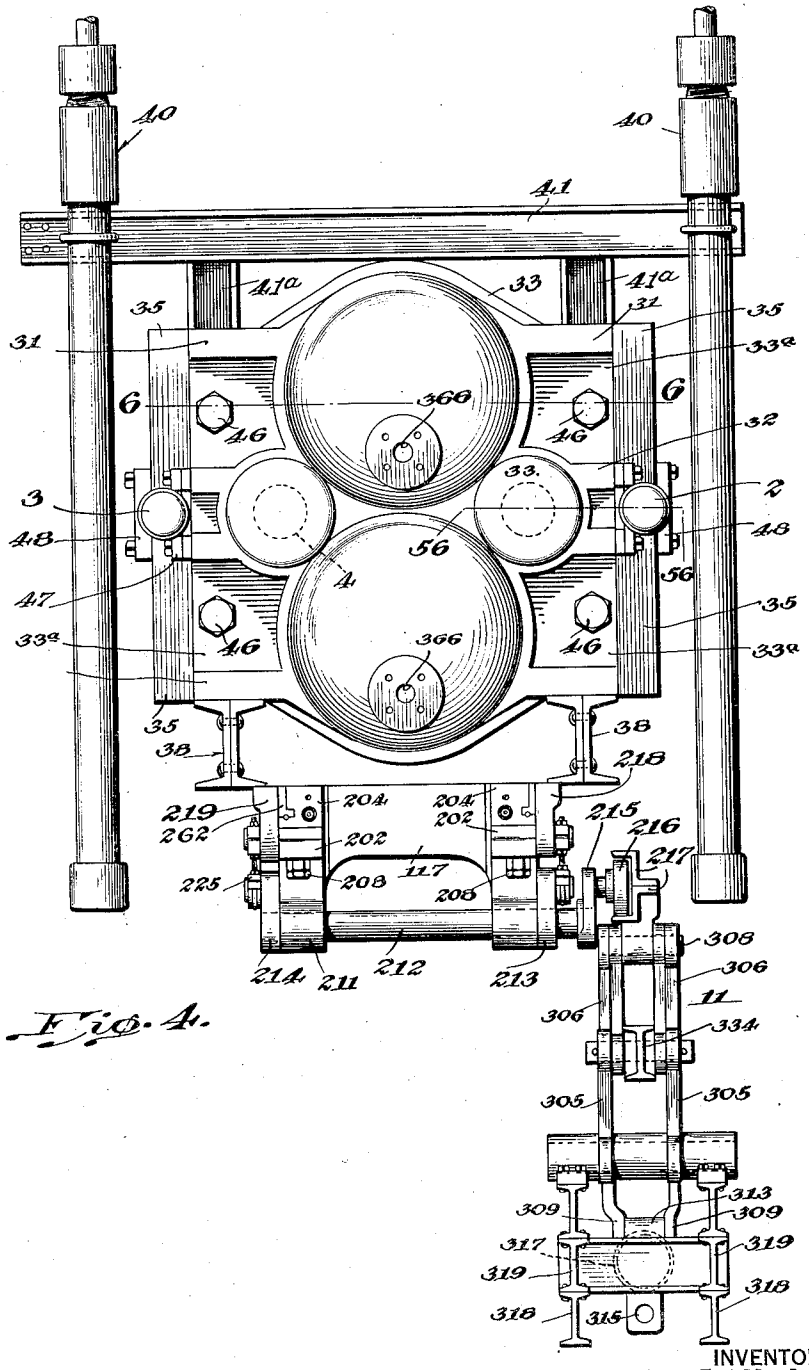


Fig. 4.

WITNESSES

Laurence O'Mankin

J. J. Schrott

INVENTOR

W. A. Wilhelm,

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Fig. 5.

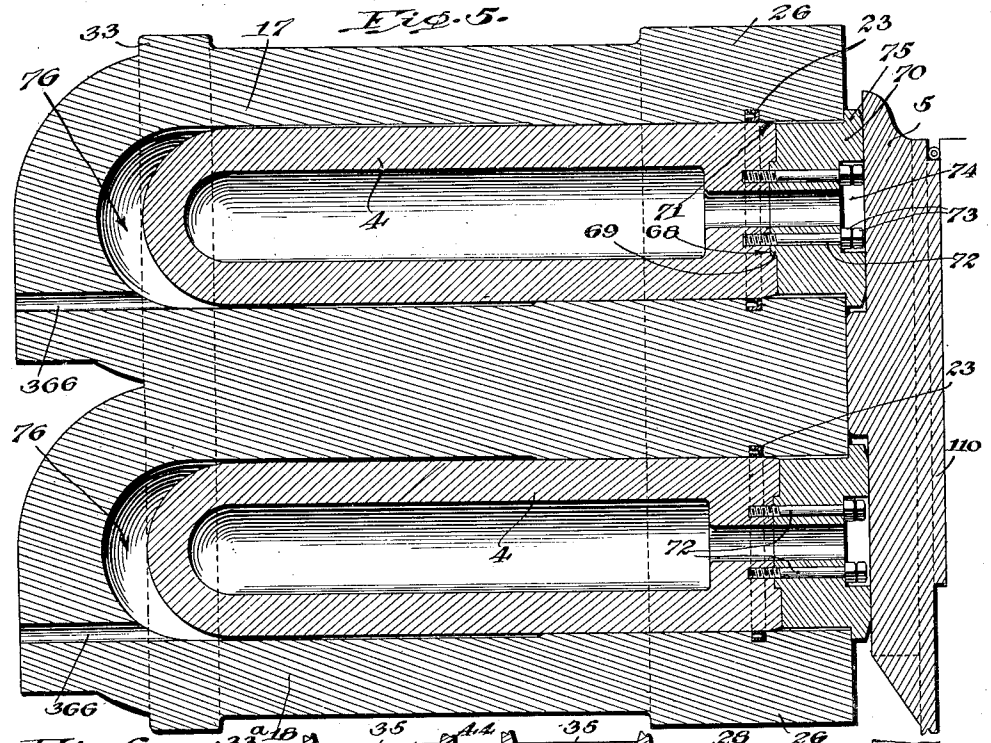
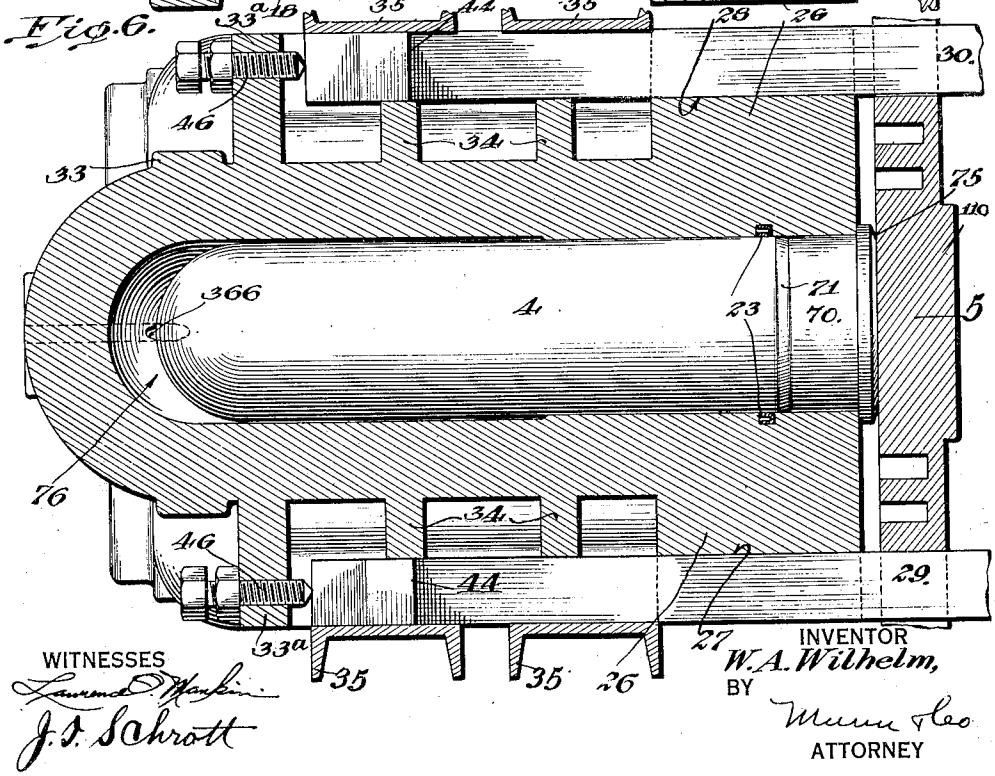


Fig. 6.



WITNESSES

Laurence O. Hopkins

J. S. Schrott

INVENTOR

W. A. Wilhelm,

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Fig. 7.

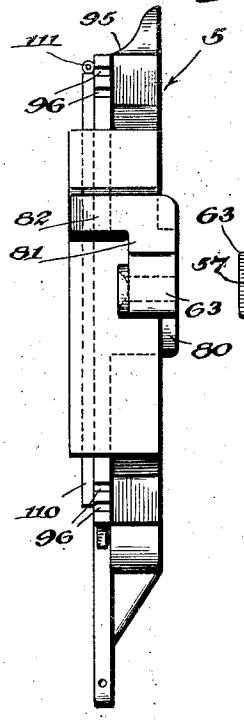


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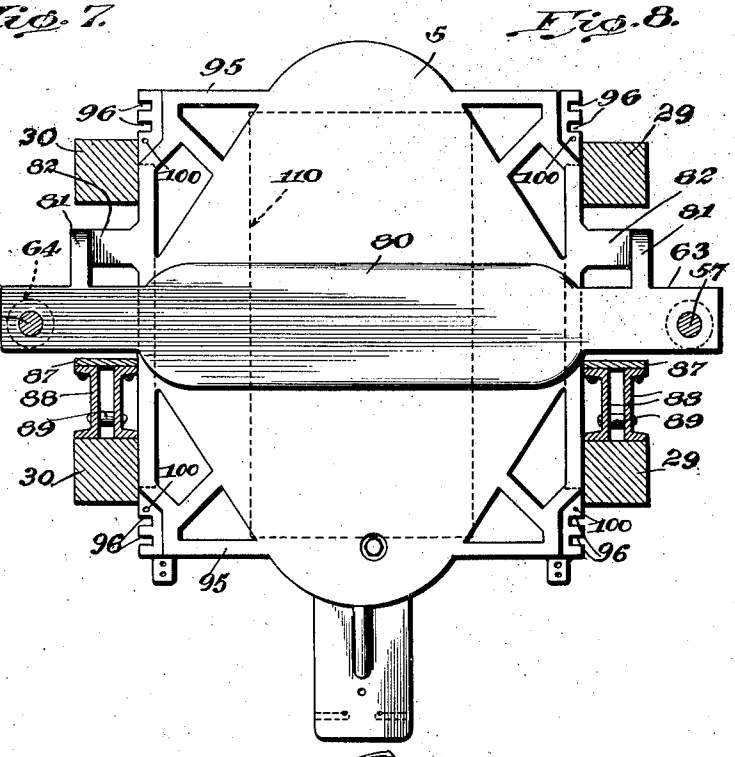
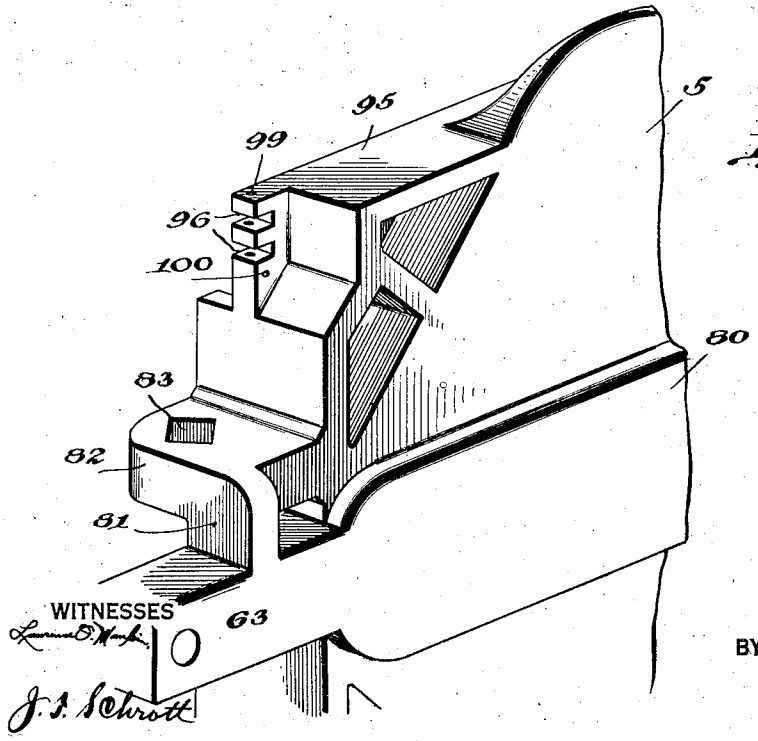


Fig. 9.



WITNESSES

J. J. Schrott

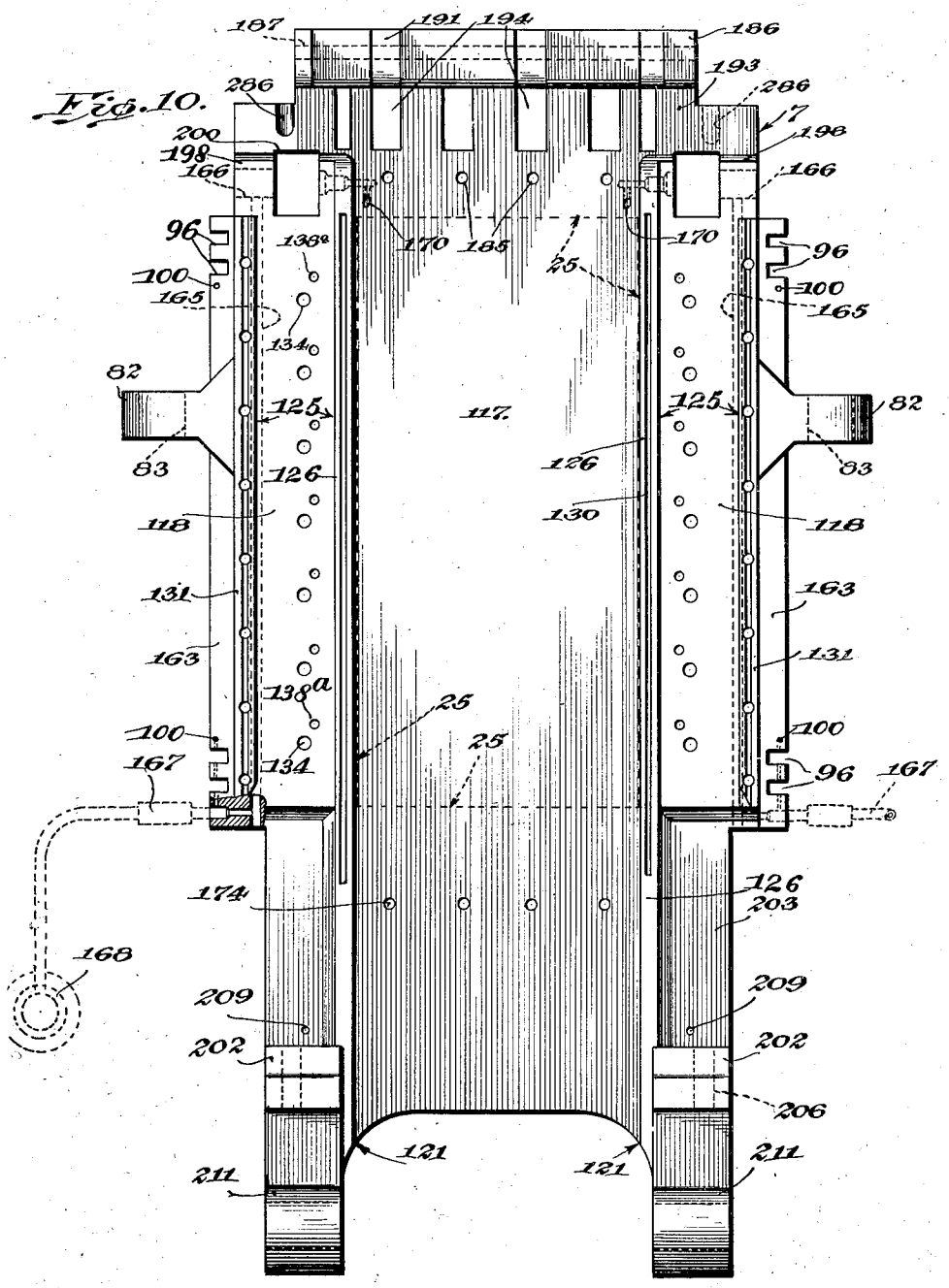
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Fig. 10.



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J. S. Schrott

INVENTOR

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Fig. 11.

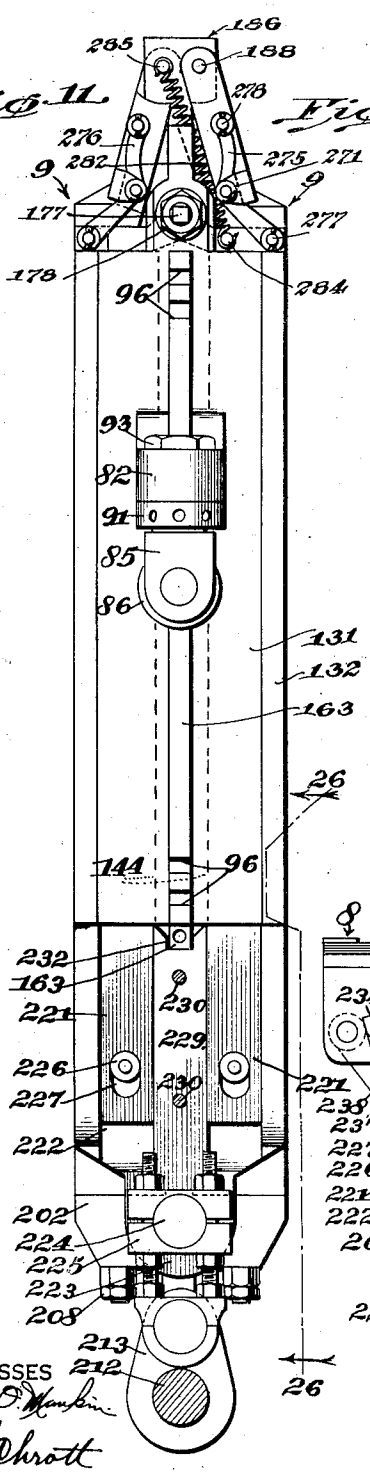
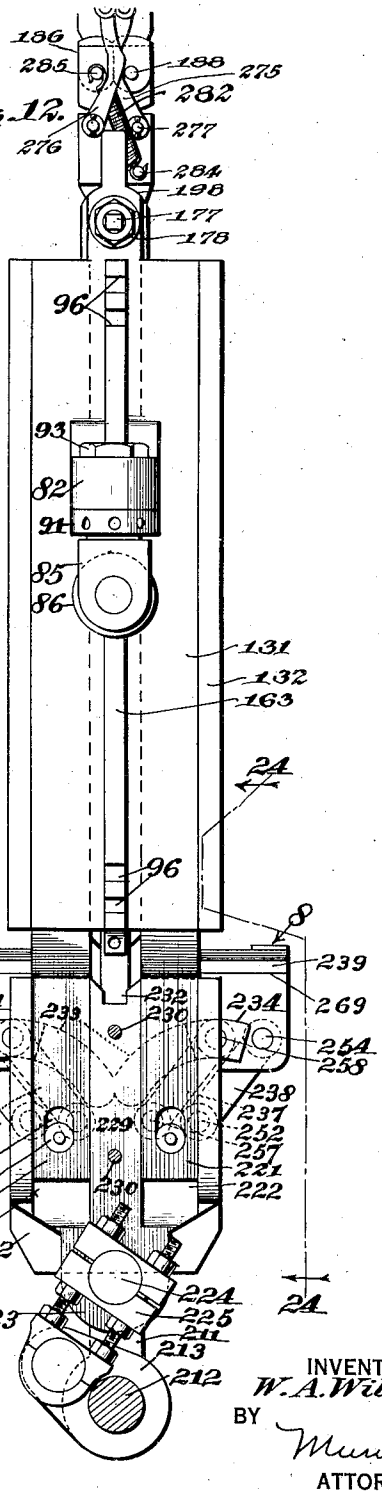


Fig. 12.



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J. J. Schrott

INVENTOR

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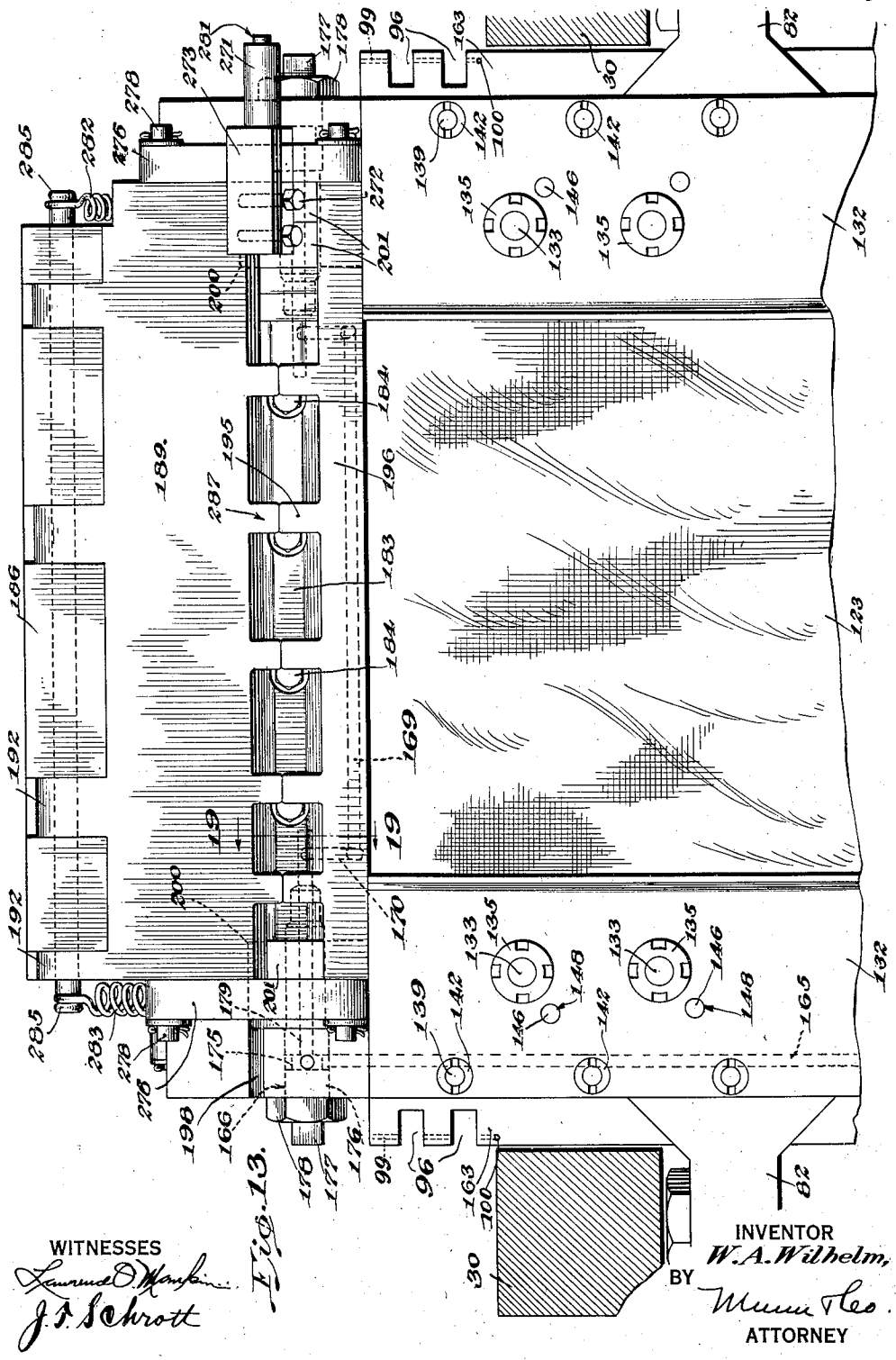


Fig. 13.

WITNESSES

Laurence O. Hankins

J. F. Schrott

INVENTOR

W. A. Wilhelm,

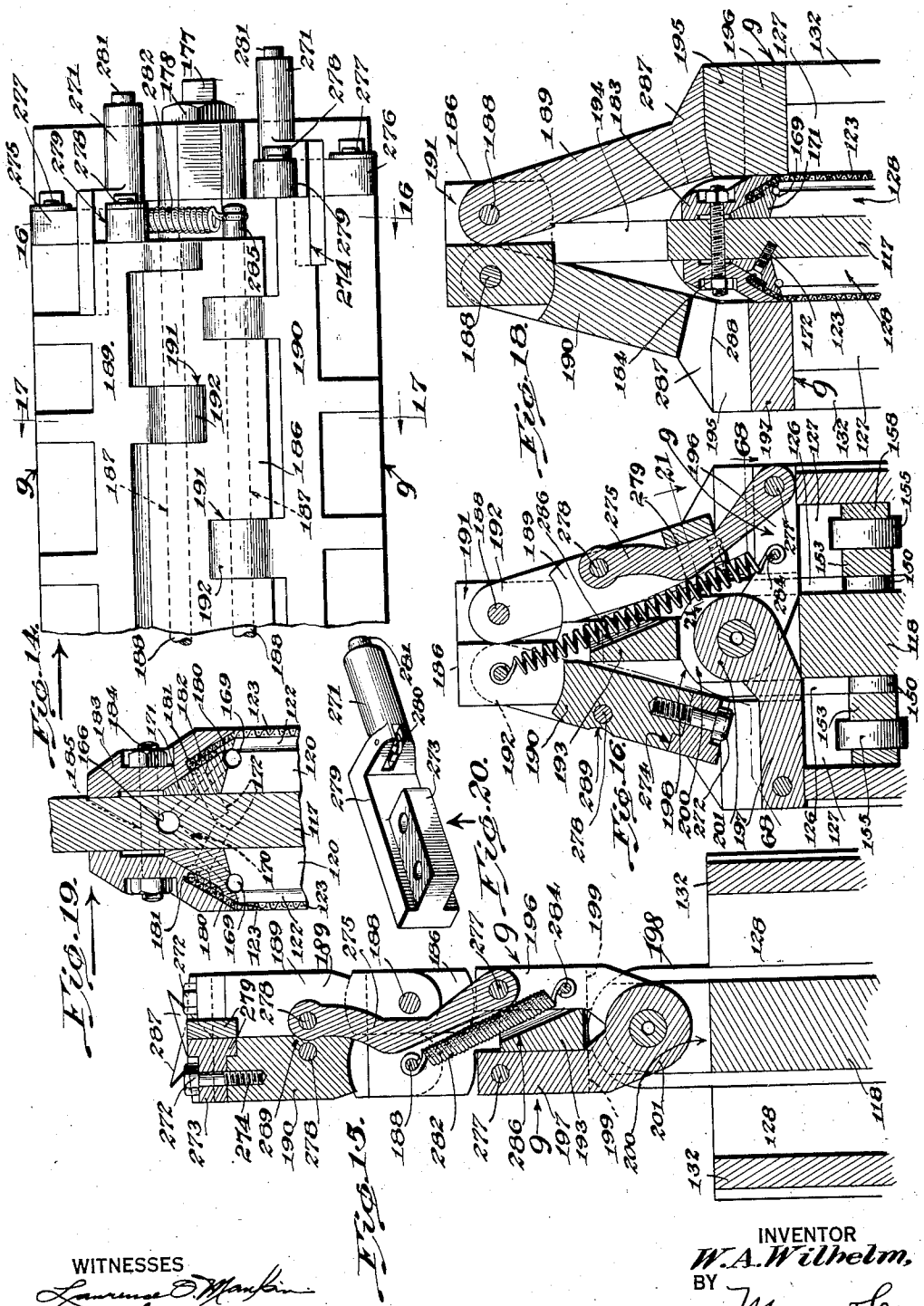
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Laurence O. Mankin

J. F. Schrott

INVENTOR

W. A. Wilhelm,

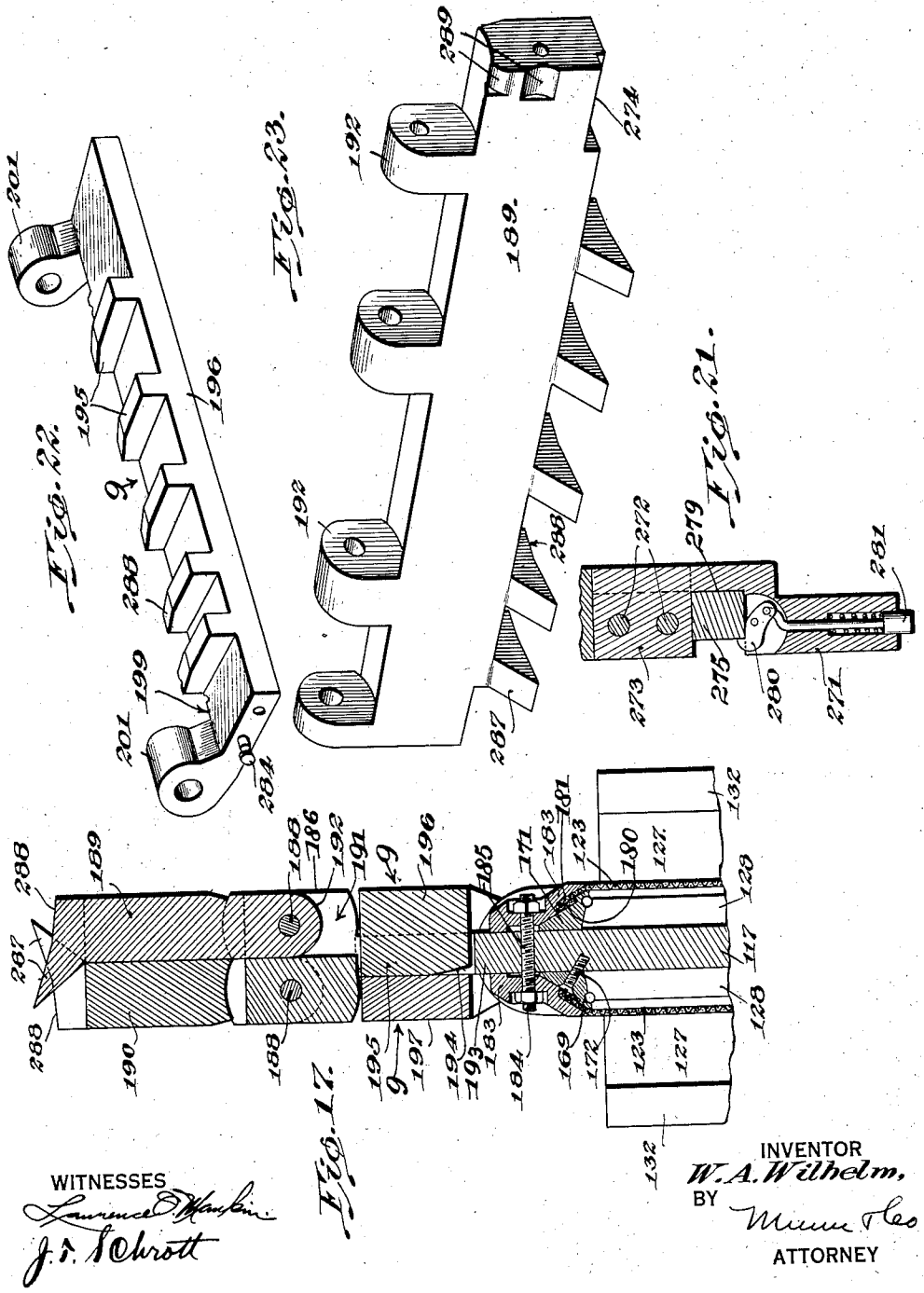
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WITNESSES

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J. F. Schrott

INVENTOR

W. A. Wilhelm.

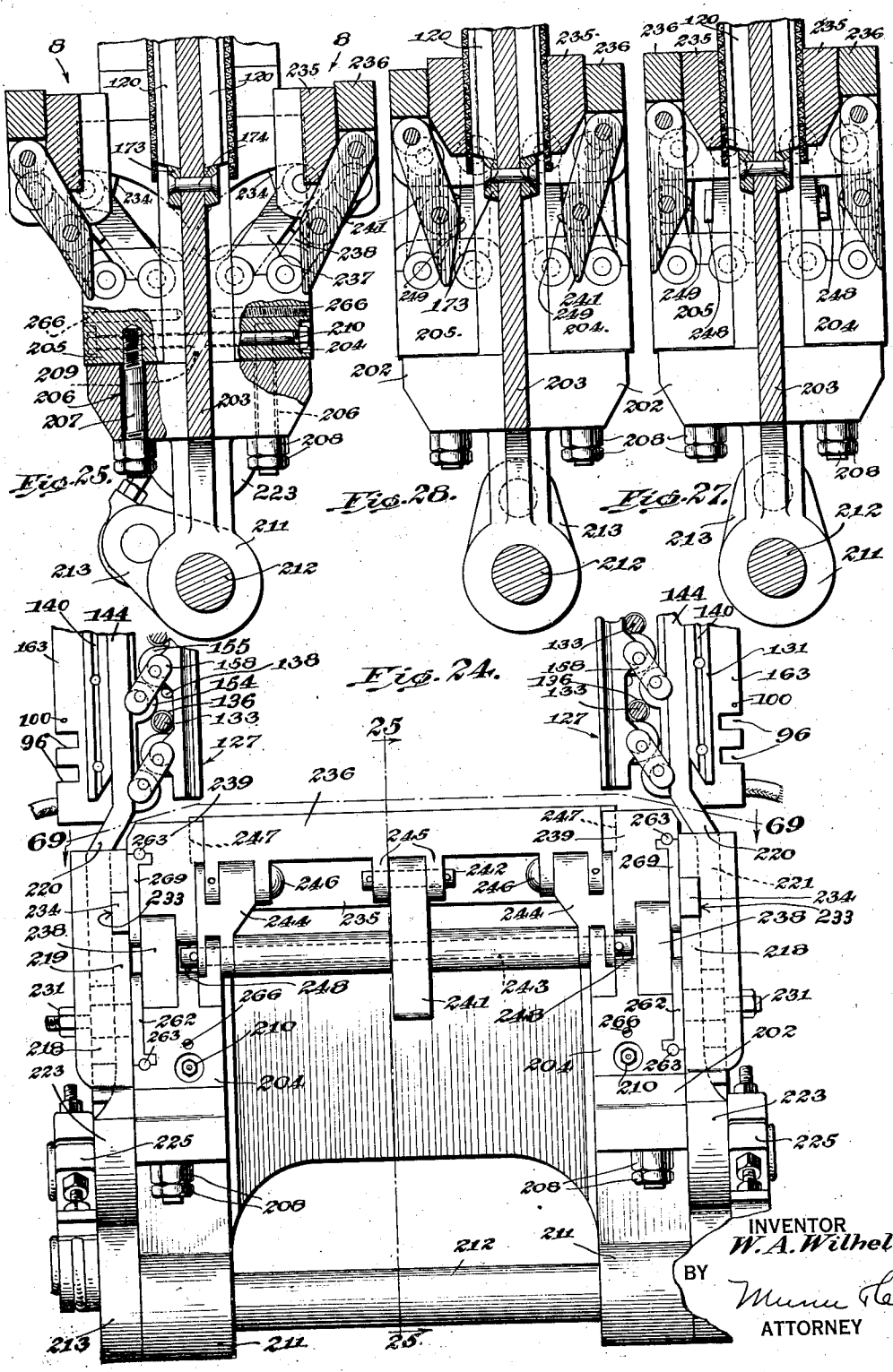
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Fig. 26.

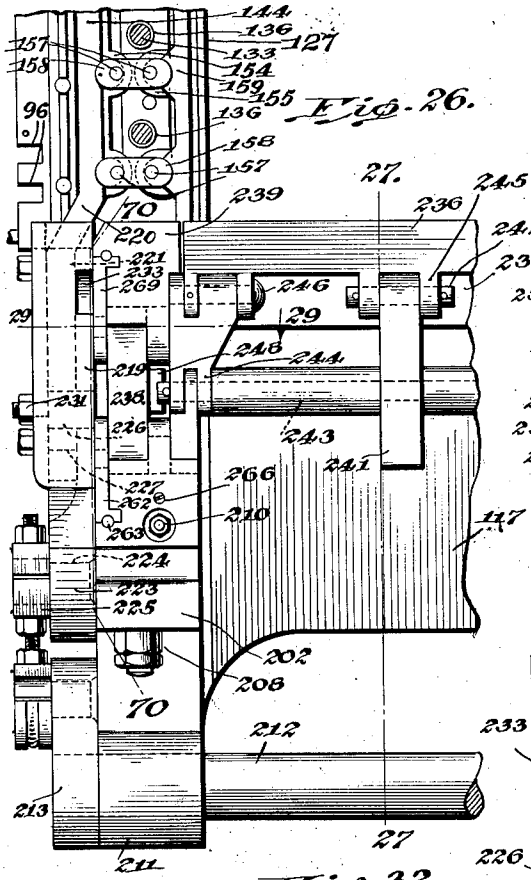


Fig. 29.

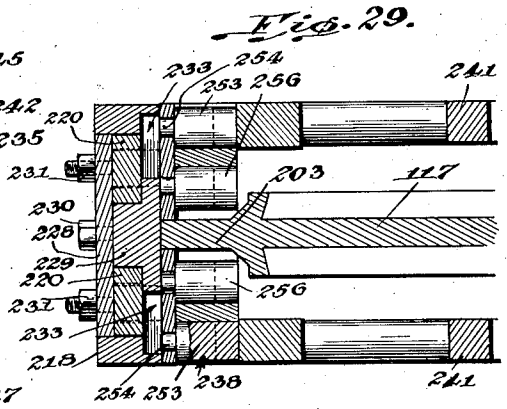


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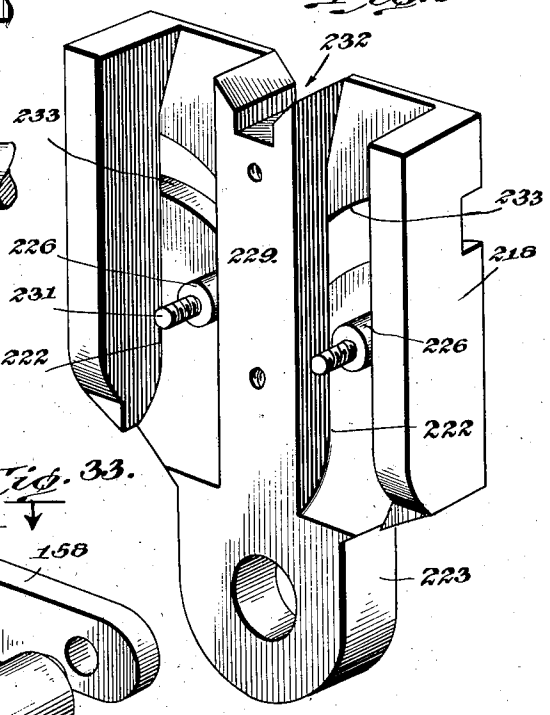


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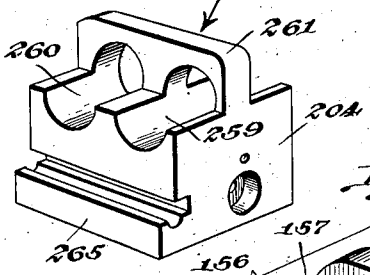
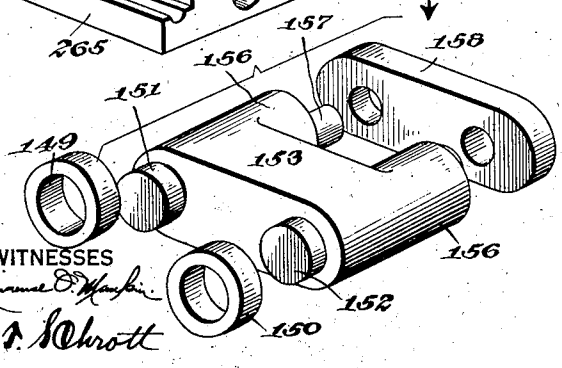


Fig. 33.



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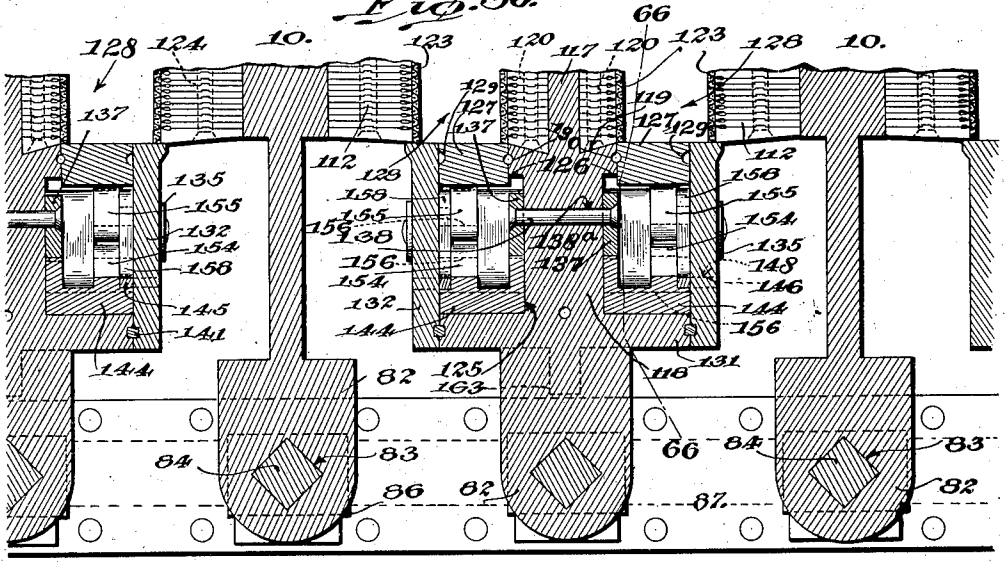
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Fig. 36.



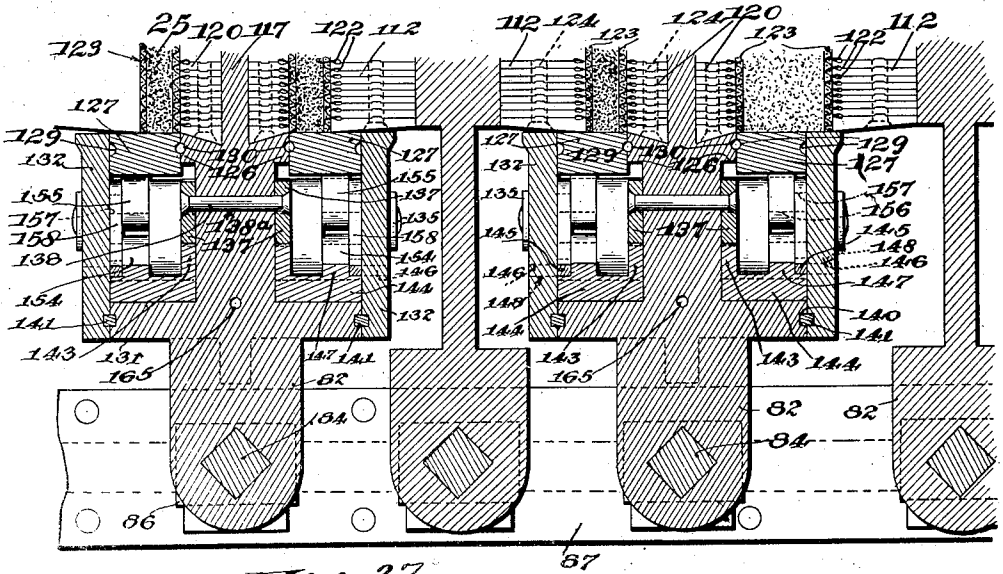


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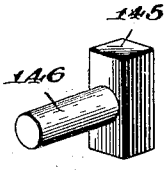


Fig. 38.

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INVENTOR

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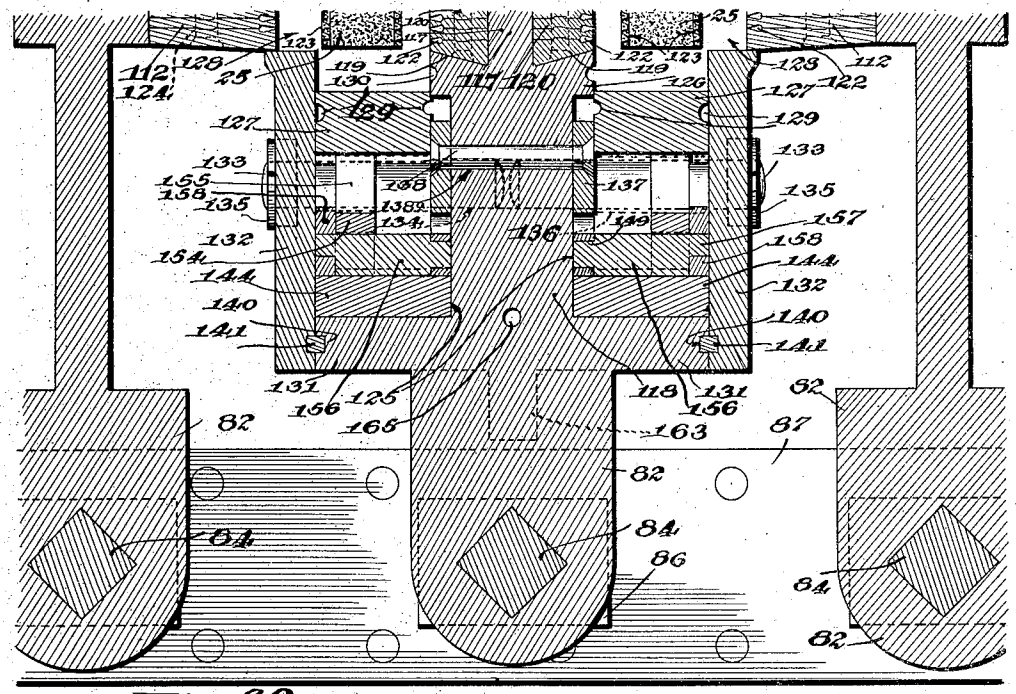


Fig. 39.

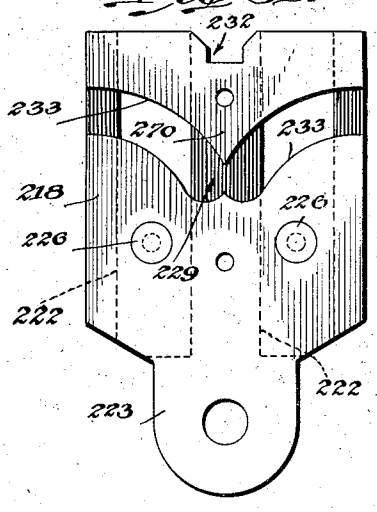


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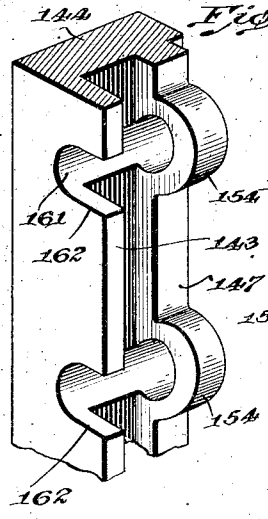


Fig. 34.

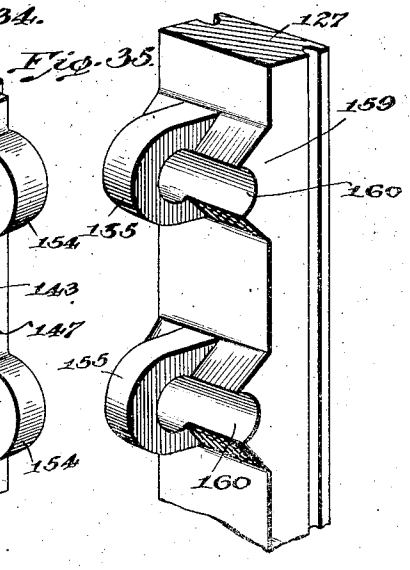


Fig. 35.

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Fig. 40.

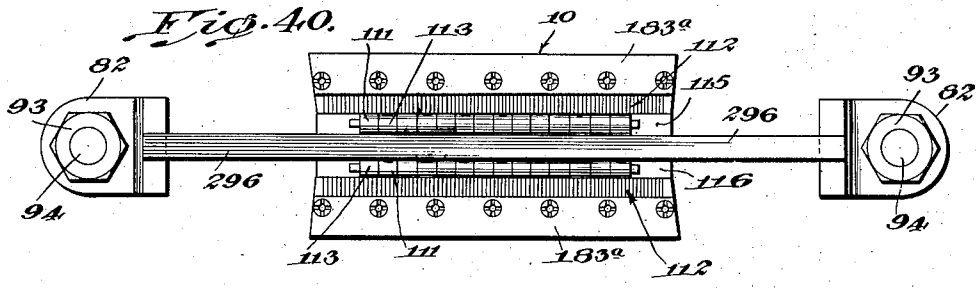
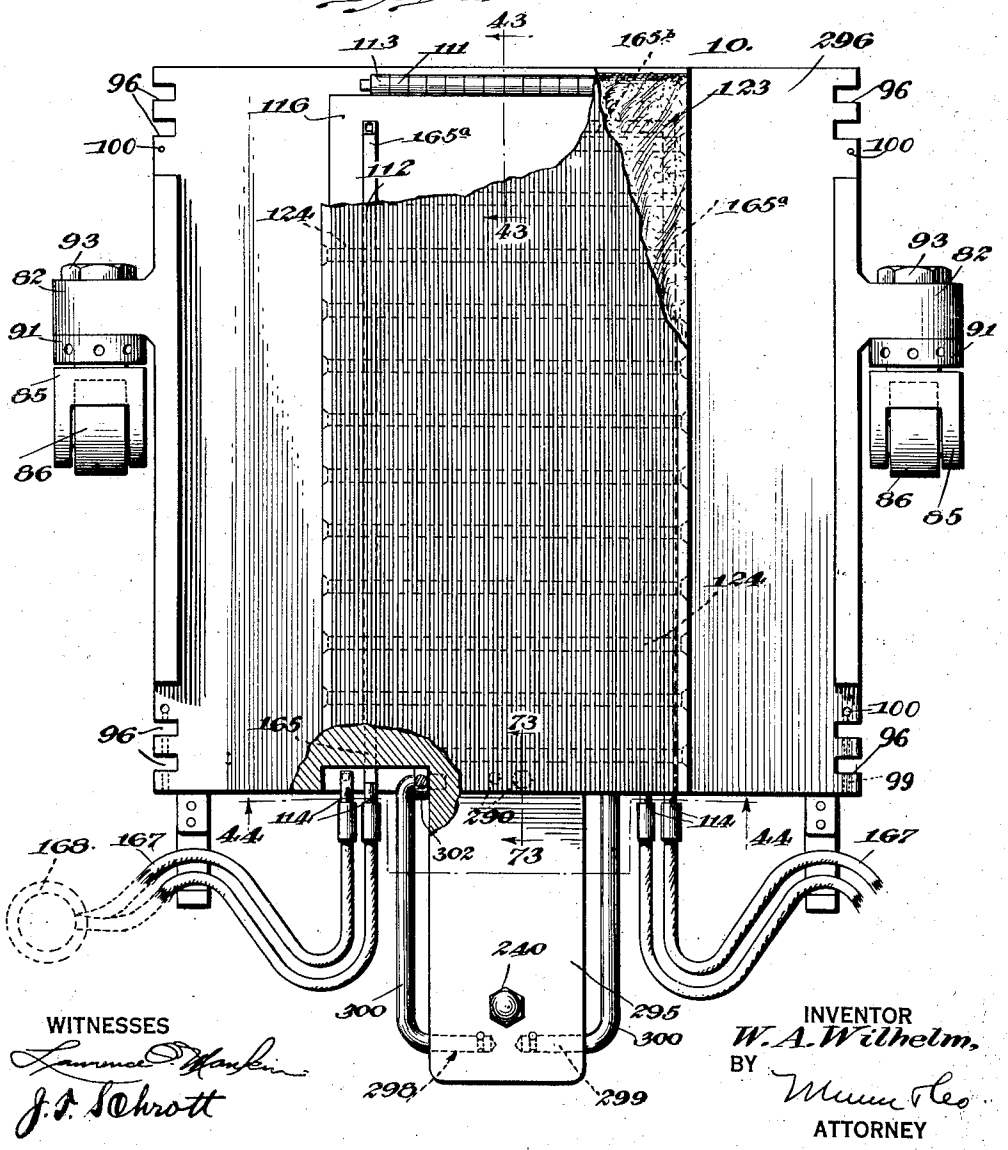


Fig. 41.



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INVENTOR

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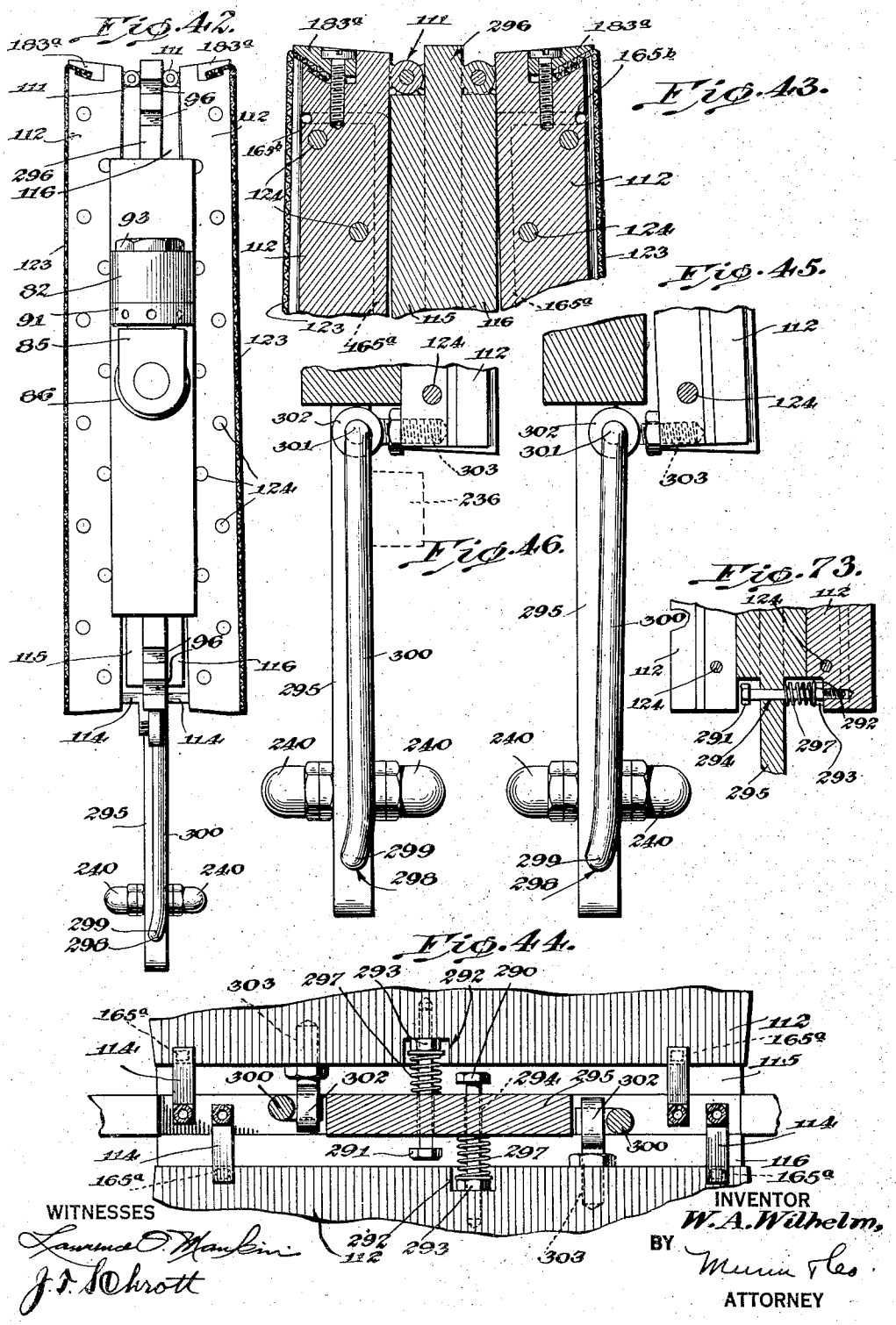
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Fig. 47.

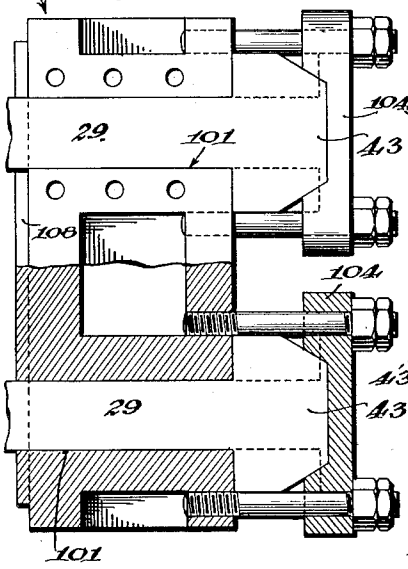


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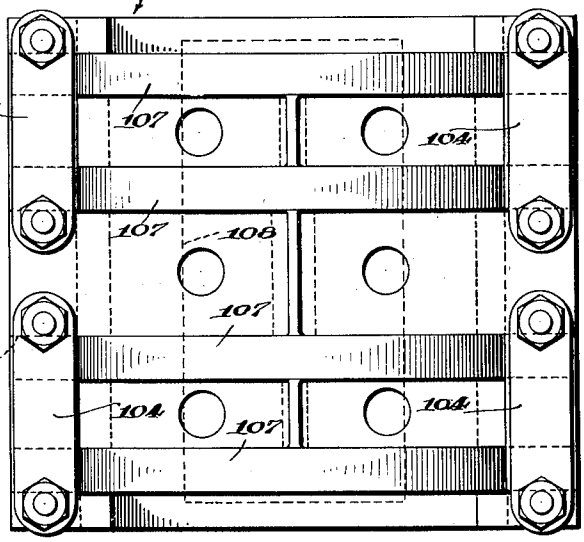


Fig. 49.

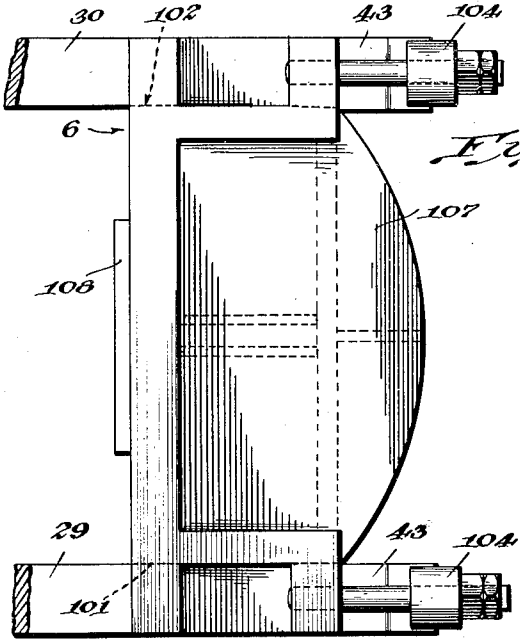
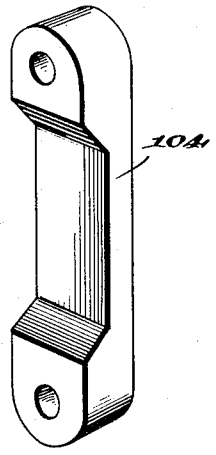


Fig. 50.



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J. F. Schrott

INVENTOR

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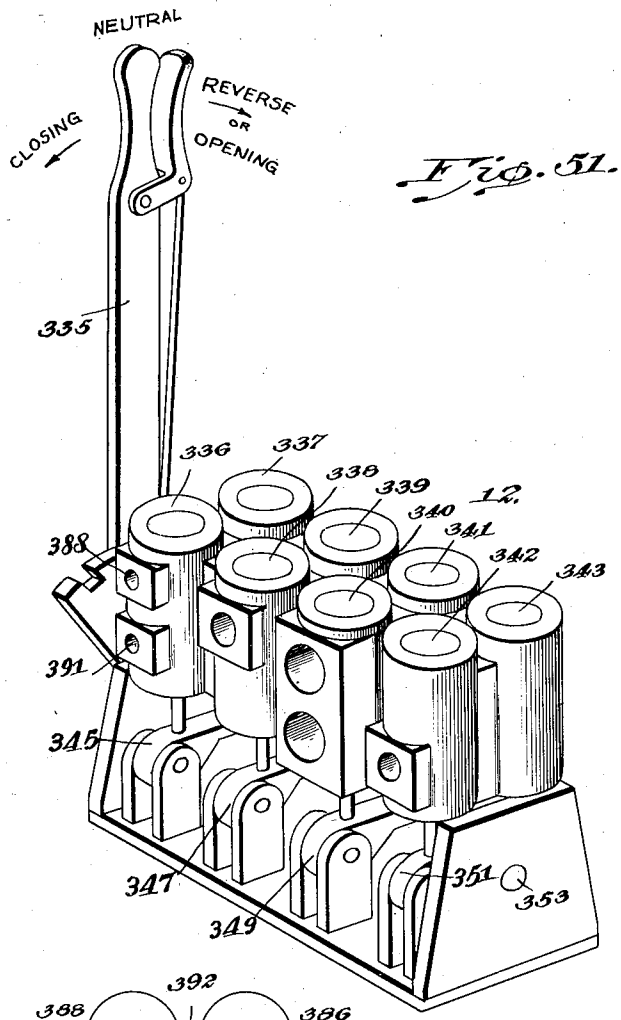


Fig. 51.

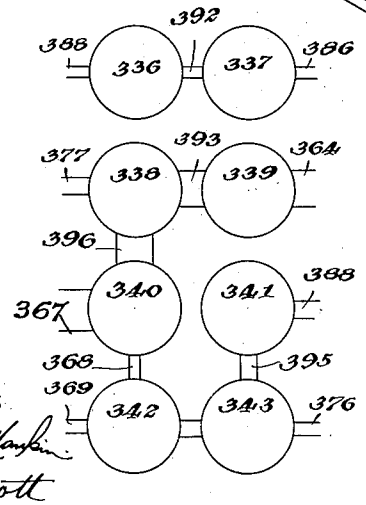


Fig. 52.

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J. F. Schrott

INVENTOR

W. A. Wilhelm,

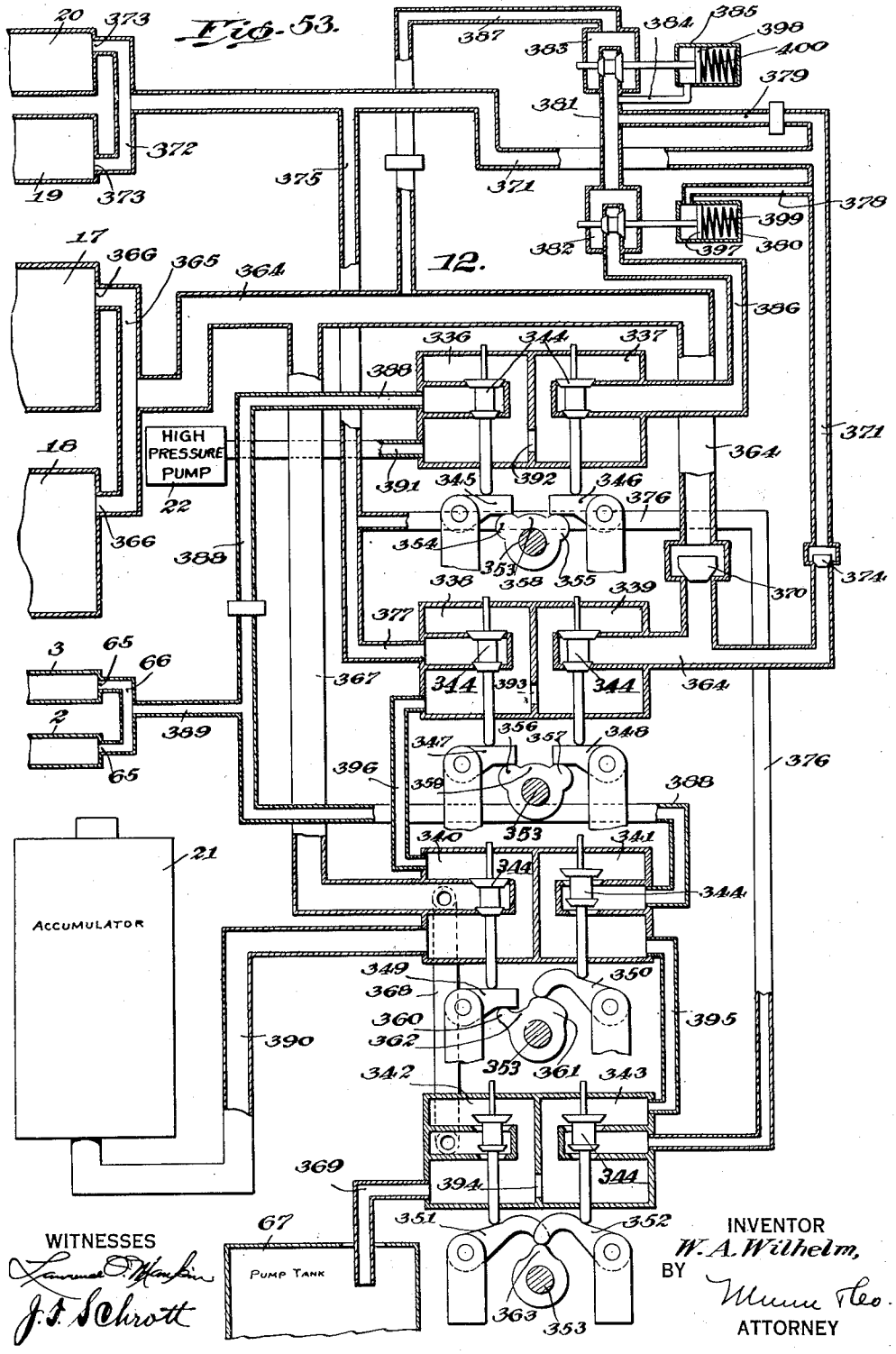
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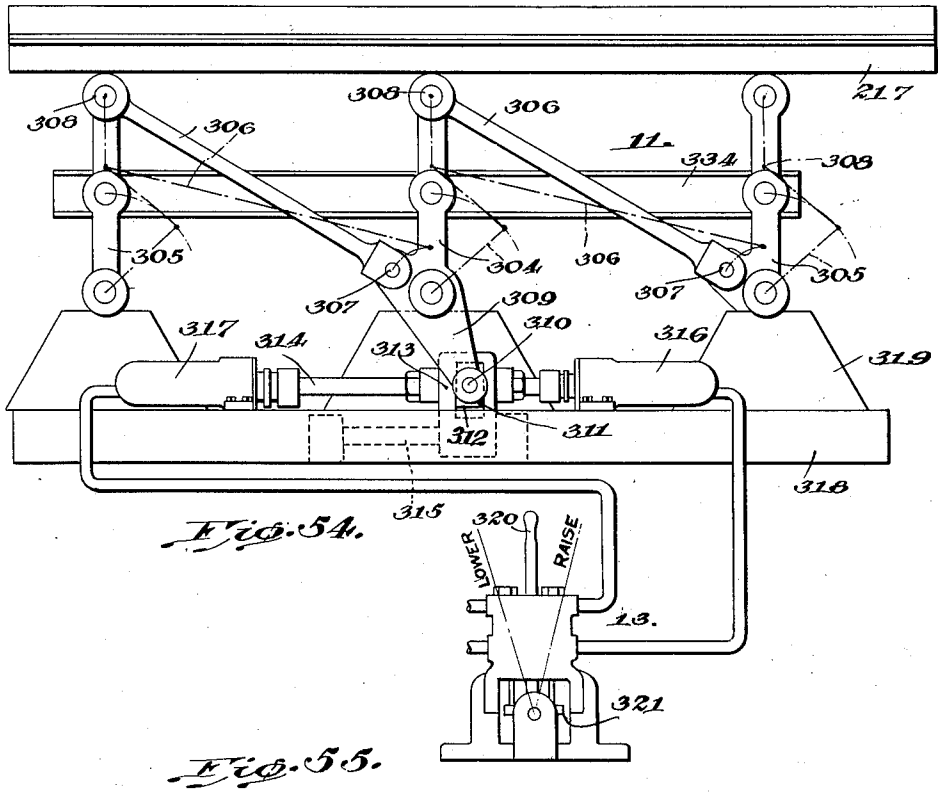
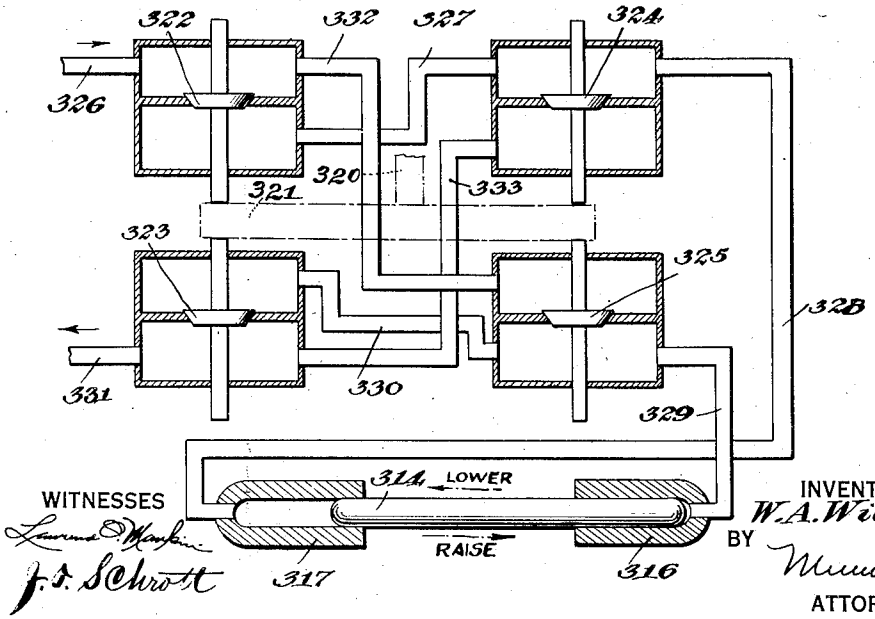


Fig. 54.

Fig. 55.



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J. L. Schrott

INVENTOR

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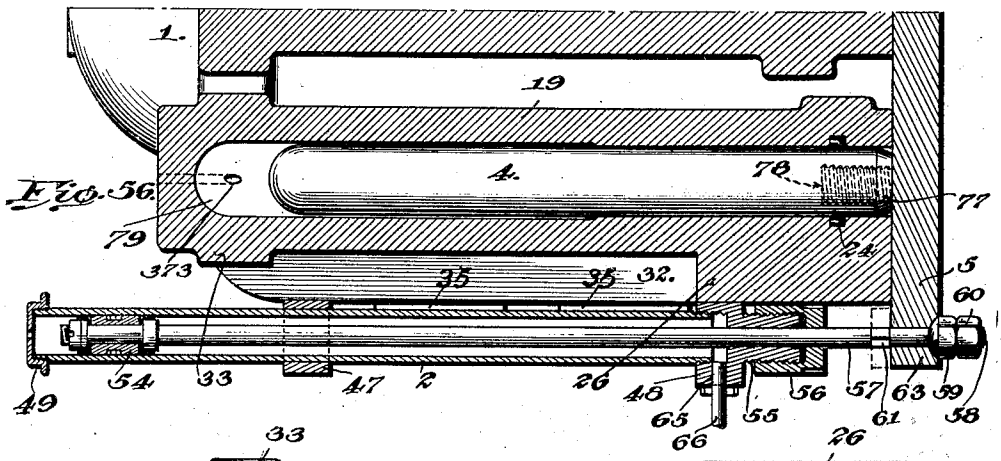


Fig. 56.

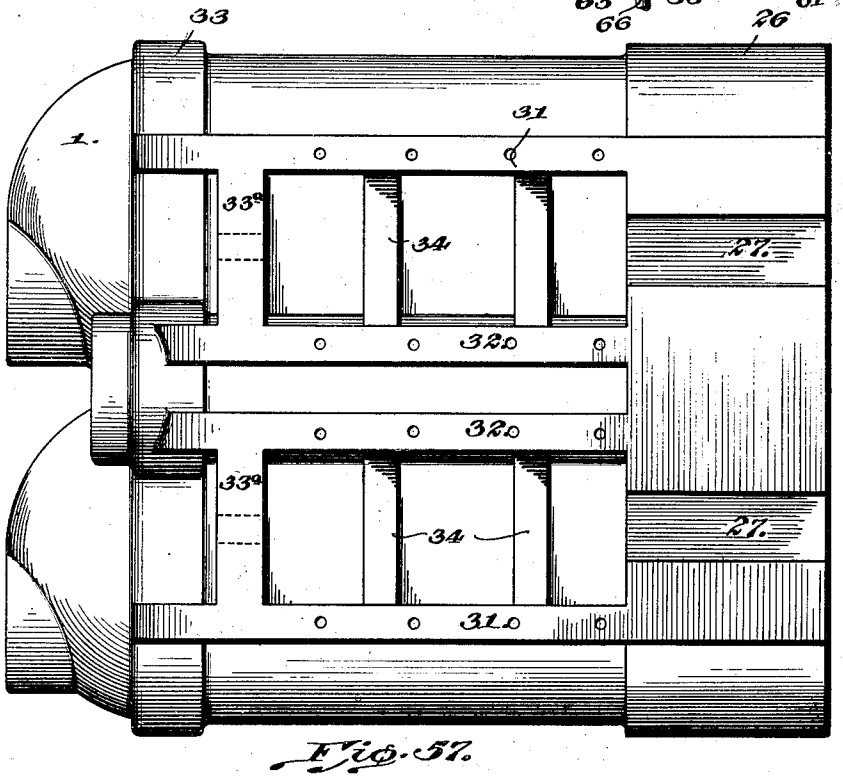


Fig. 57.

WITNESSES

Lawrence O. Mankin

J. J. Schrott

INVENTOR

W. A. Wilhelm,

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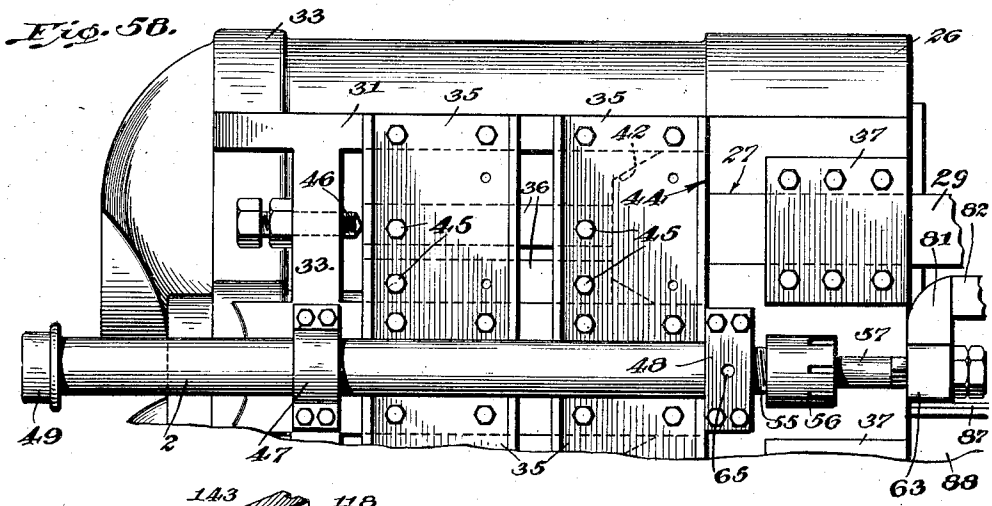
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Fig. 58.



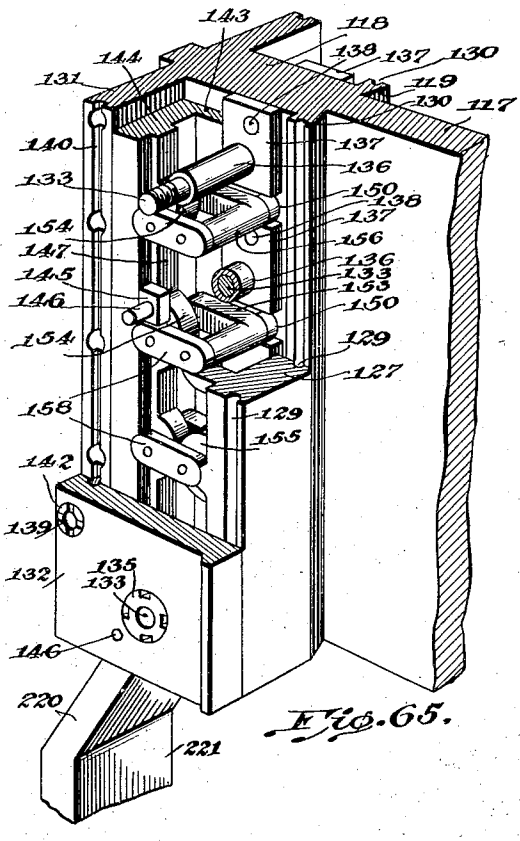


Fig. 65.

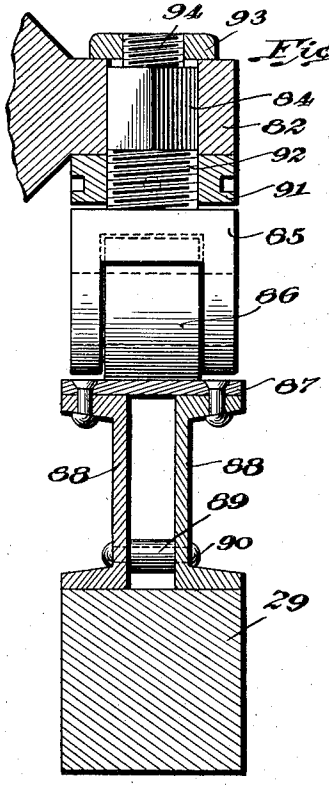


Fig. 59.

WITNESSES

Laurence O. Hopkins

J. J. Schrott

INVENTOR

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Fig. 60.

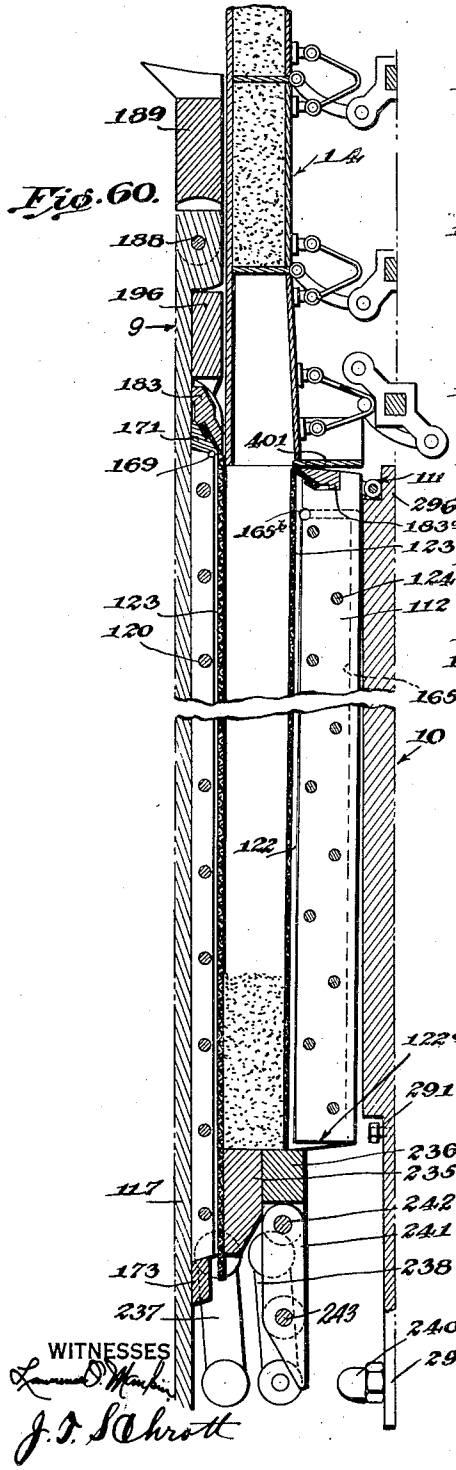
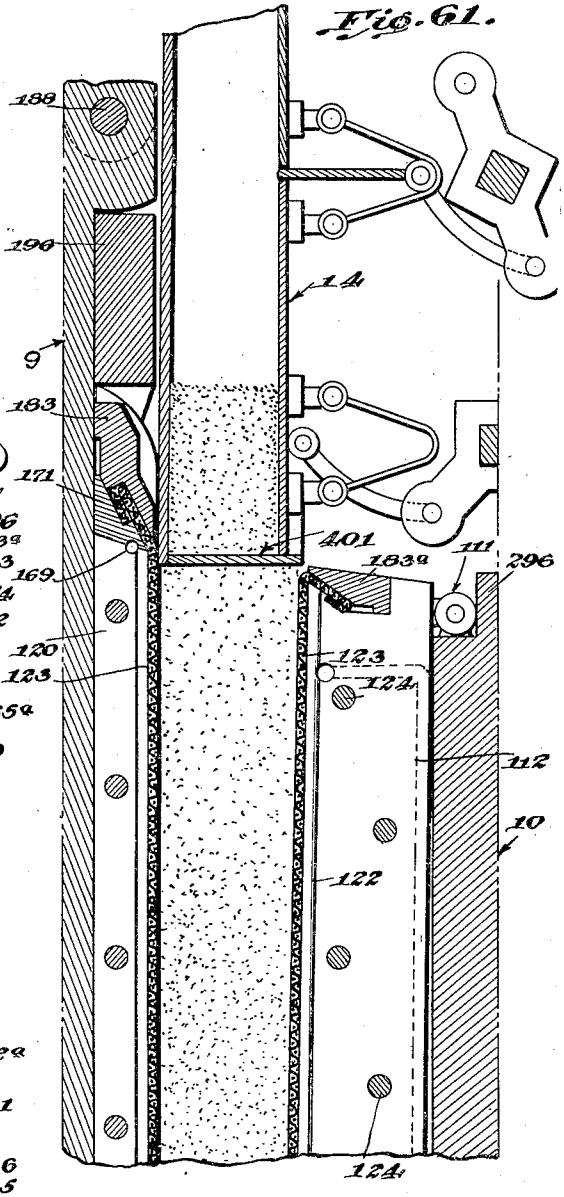


Fig. 61.



WITNESSES

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Sept. 18, 1934. W. A. WILHELM 1,973,786

PRESS

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Fig. 62.

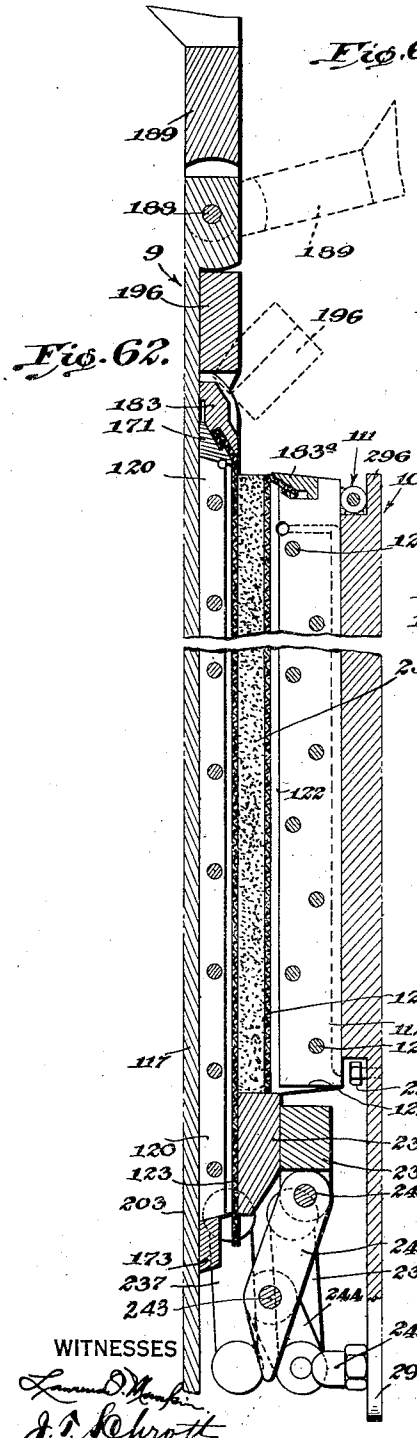


Fig. 62a.

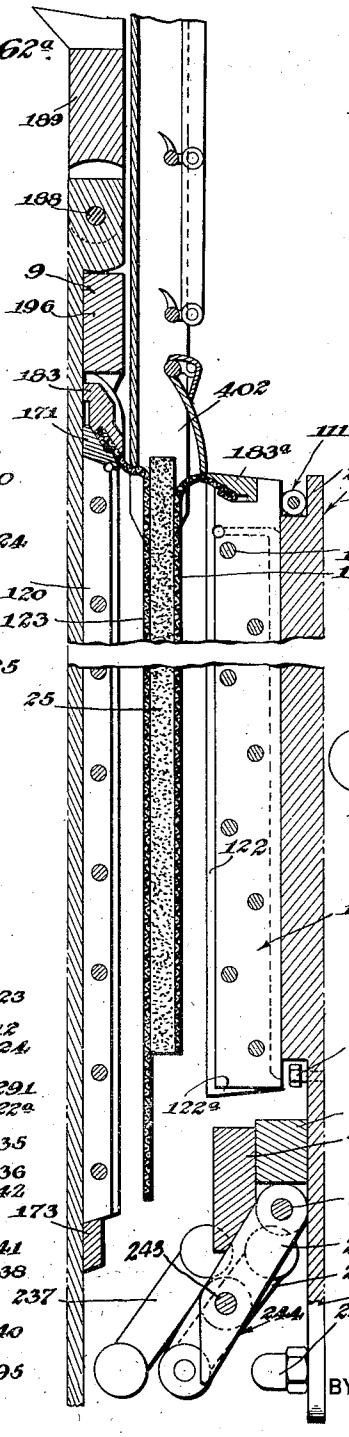
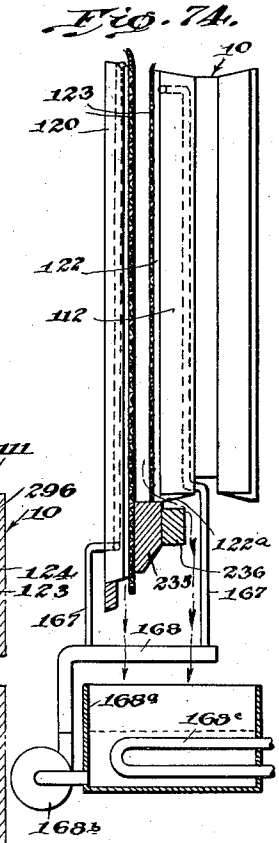


Fig. 74.



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PRESS

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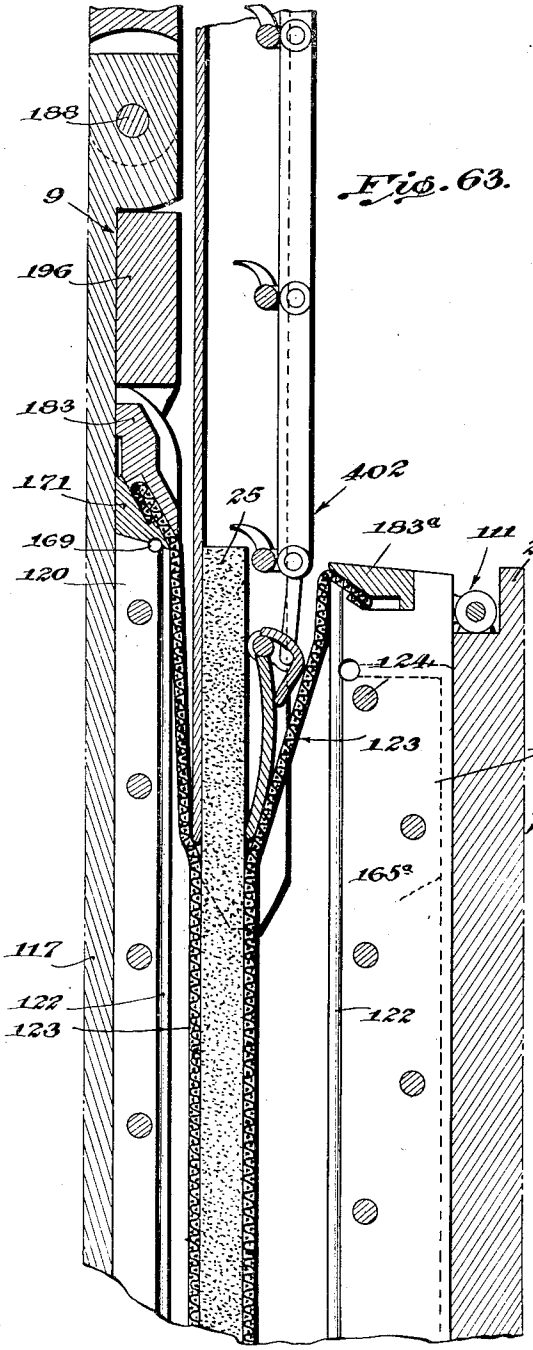


Fig. 63.

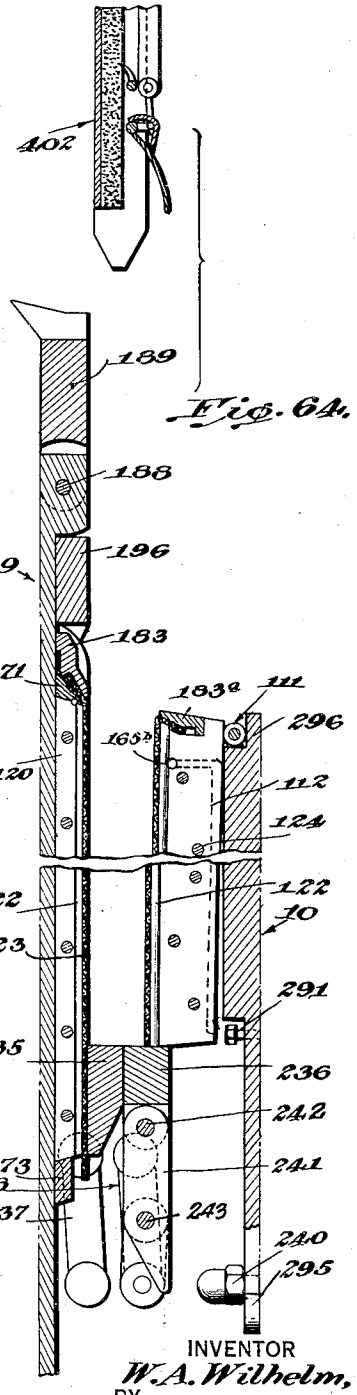


Fig. 64.

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PRESS

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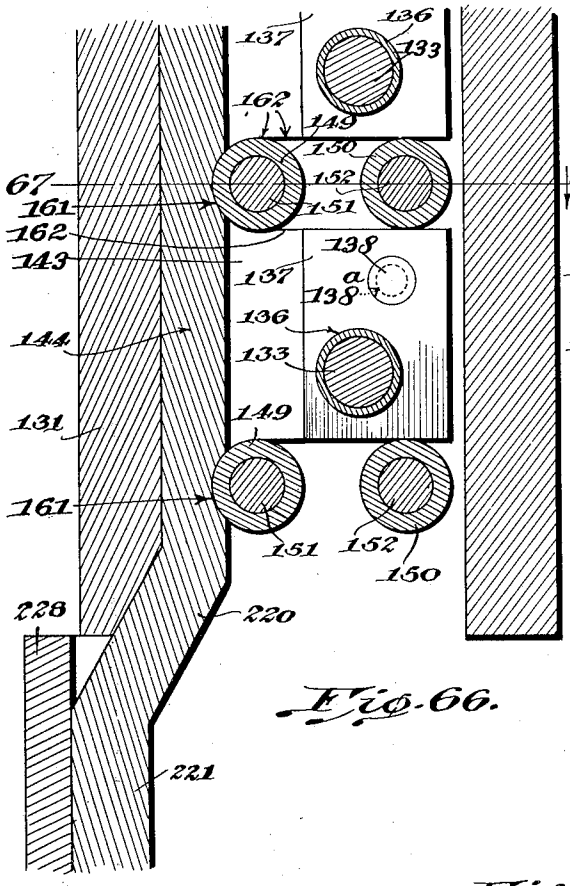


Fig. 66.

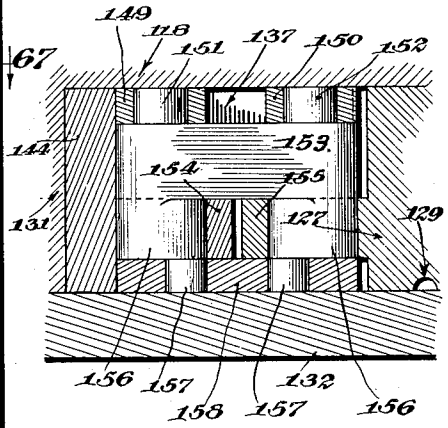
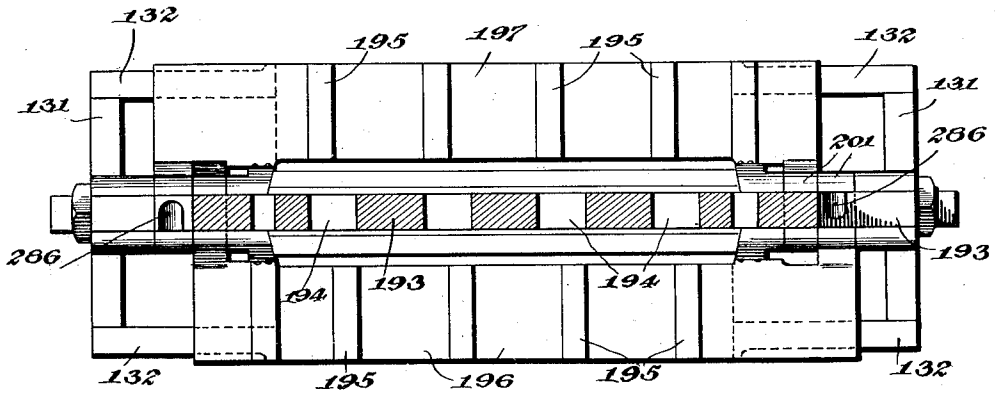


Fig. 67.

Fig. 68.



WITNESSES

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Sept. 18, 1934. W. A. WILHELM 1,973,786

PRESS

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Fig. 69.

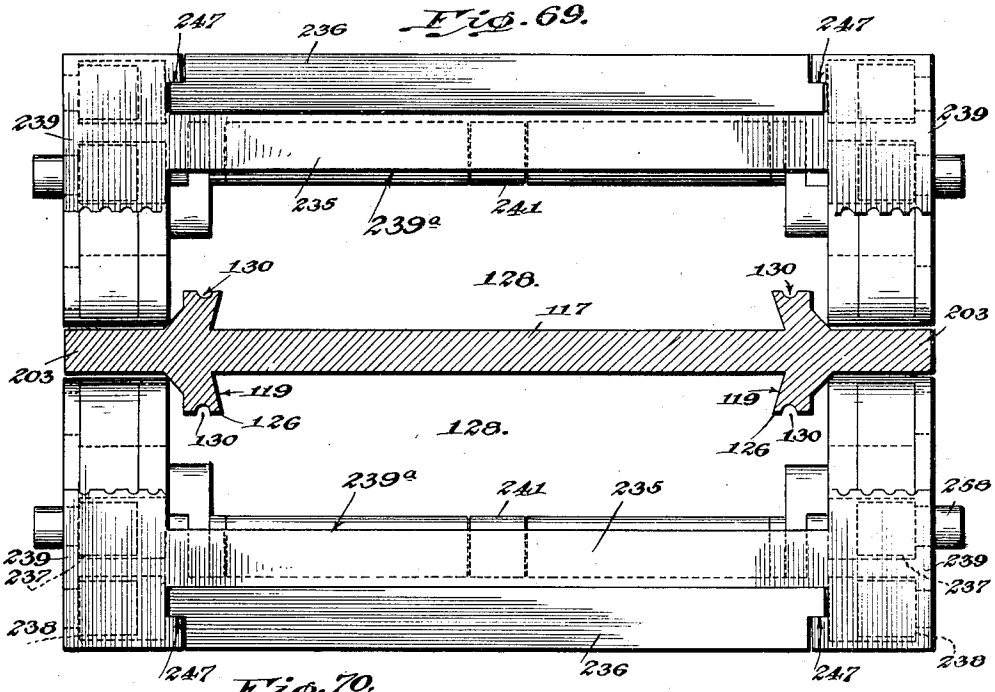


Fig. 70.

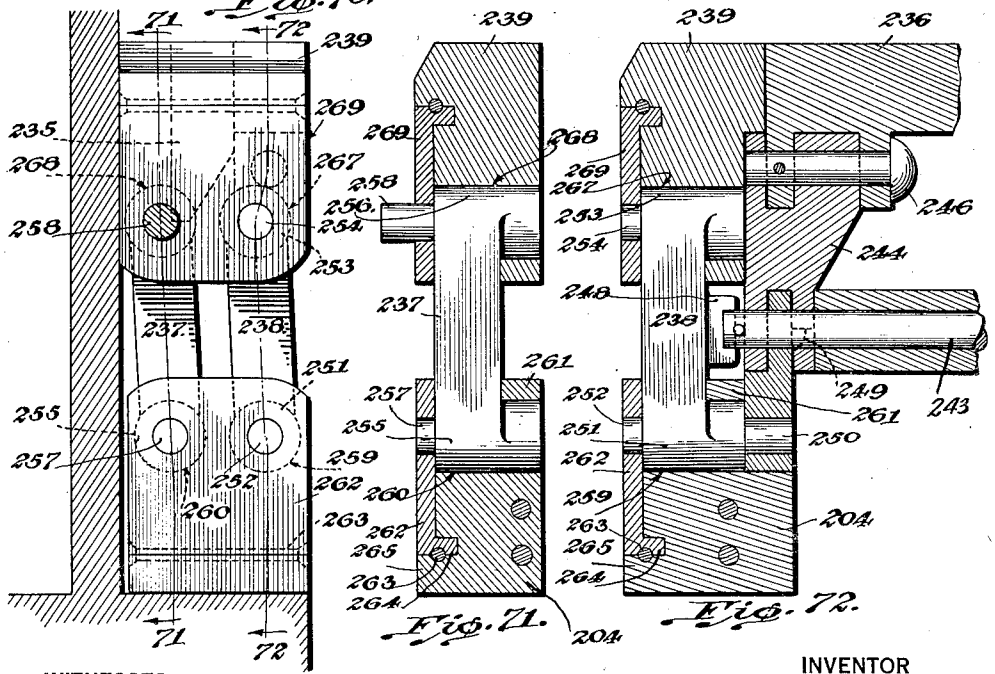


Fig. 71. Fig. 72.

WITNESSES

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Patented Sept. 18, 1934

1,973,786

UNITED STATES PATENT OFFICE

1,973,786

PRESS

Wilson A. Wilhelm, Vernon, Tex.

Application August 11, 1930, Serial No. 474,602

121 Claims. (Cl. 100—50)

This invention relates to improvements in presses and systems for handling liquid-bearing substances, and it consists of the constructions, combinations and arrangements herein described and claimed.

One of the outstanding purposes of the invention is to establish a system whereby a liquid-bearing substance can be conducted through all of a plurality of necessary stages for the extraction of the liquid contained thereby, use being made of such an arrangement of mechanical means distributed over the various stages as to place the entire system under the control of a single workman.

Another object of the invention is to produce the combination of what are herein known as the distributor meal carriage and cake stripper with a press, the co-action of each of these elements with certain others being to the end of charging the press with substance, extracting the liquid then removing the dry stock in cake form.

Another object of the invention is to provide as an important part of the system, a press which is made to assume that position wherein all of its compression boxes can be loaded simultaneously with the liquid-bearing substance which is herein known as cooked cotton seed meal or meats merely by way of example.

Another object of the invention, and one bearing directly on the foregoing statement, is to provide a press arranged on a generally horizontal plane in order to have the compression boxes open at the top to enable a gravity loading of all of said boxes with a simultaneous operation, although the loading function is actually accomplished piecemeal for the purposes of permitting the escape of any air likely to be entrapped and insuring a compacting of the material.

Another object of the invention is to rigidly confine on all sides and edges a volume of material from which the liquid is to be extracted thus to insure the application of pressure to every part of the volume without any possibility of the material "enlarging" in the press, or in other words, liquid-bearing portions squeezing or oozing out to be ultimately discarded with the consequent loss of the liquid.

Another object of the invention is to make provision in the press for the prompt drainage of the heaviest surge or largest volumes of liquid expressed from the stock during extraction, as well as an adequate outlet for the liquid with which the drainage heads are flushed during the extracting operation, said flushing beginning when the act of extraction is approximately one half through.

Another object of the invention is to make provision in a press for insuring uniformity in the density of the stock about to undergo compression, so that the act of extraction may be uniform and that a deformation or distortion of the cake and damage to the press mechanism may be avoided.

A further object of the invention is to effect a notable economy in the press cloth by arranging the compression box in such a manner that the stock will be encompassed completely by parts of the box and head, thus requiring the use of only enough cloth to cover the drainage heads and obviating the end overlaps or wrappings which are customarily required.

A further object of the invention is to provide a press which is expansible in the sense of its being enlarged for the handling of volumes of stock additional to those for which it was initially set, this expansion being accomplished by a mere readjustment of what are herein known as the press columns without the necessity of dismantling the press or of compelling a long and expensive shut down.

A still further object of the invention is to employ a simple yet decidedly advantageous mode of making possible the changing of crimps in the cylinders of certain rams, the principal factors of this mode being the dispatch with which the whole can be accomplished and the entire avoidance of danger to the safety of the workers.

Other objects and advantages will appear in the following specification, reference being had to the accompanying drawings in which

Figure 1 is a front elevation of the improved press.

Figure 2 is a plan view of the press cylinders seen at the left of Figure 1, the shafts or vertical rams of a certain cake stripper with which this application is not concerned being shown in section.

Figure 3 is a cross section of the press cylinders taken on the line 3—3 of Figure 1.

Figure 4 is a left end elevation of the press, the foundation being omitted to avoid the obstruction of certain important parts.

Figure 5 is a longitudinal section particularly illustrating the main cylinders of the cylinder block, the view being taken on the line 5—5 of Figure 2,

Figure 6 is a horizontal section taken on the line 6—6 of Figure 4,

Figure 7 is an elevation of the rear edge of

the ram block, the view appearing as seen by an observer from a position opposite to that of Figure 1.

Figure 8 is a cross section taken on the line 8—8 of Figure 1, showing the ram block.

Figure 9 is a fractional perspective view of the ram block of Figure 8.

Figure 10 is an elevation of one of the double receiving box castings with six of which the instant press is equipped according to the showing in Figure 1.

Figure 11 is a front elevation of one of the double receiving boxes, the top and bottom end gates being in the closed position.

Figure 12 is a similar view, the top and bottom end gates being in the open position.

Figure 13 is a detail end elevation of a portion of one of the double receiving boxes particularly showing the top end gate and the key bar for locking it in the closed position, portions of a pair of the press columns being shown in section.

Figure 14 is a detail plan view of that portion of the structure at the right of Figure 13.

Figure 15 is a vertical section showing the top end gates open.

Figure 16 is a section taken on the line 16—16 of Figure 14 showing the top end gates closed.

Figure 17 is a vertical section as though taken on the line 17—17 of Figure 14, the top end gates again being in the open position.

Figure 18 is a view similar to Figures 11 and 17, the top end gates being closed.

Figure 19 is a detail vertical section of one of the oil ducts and manifolds, taken on the line 19—19 of Figure 13, but omitting the top end gates.

Figure 20 is a detail perspective view of one of the top end gate handles.

Figure 21 is a detail section of the handle taken on the line 21—21 of Figure 16.

Figure 22 is a perspective view of one of the top end gate bars.

Figure 23 is a detail perspective view of one of the co-acting key bars.

Figure 24 is a side elevation of one of the press boxes as when viewed on the section line 24—24 of Figure 12, the bottom end gate and edge walls being open.

Figure 25 is a section taken on the line 25—25 of Figure 24.

Figure 26 is a fractional side elevation of one of the press boxes as though viewed on the section line 26—26 of Figure 11, the bottom end gate and edge walls being shown closed.

Figure 27 is a cross section taken on the line 27—27 of Figure 26.

Figure 28 is a view similar to Figure 27 showing the tripped position of the trip bars whereat the low pressure bars are lowered for a free passage of oil.

Figure 29 is a detail horizontal section taken on the line 29—29 of Figure 26.

Figure 30 is a perspective view of one of the control guides.

Figure 31 is a rear elevation of the control guide.

Figure 32 is a perspective view of one of the rocking post bearing blocks.

Figure 33 is a perspective view of one of the edge wall release links, its parts being shown separated.

Figure 34 is a fractional perspective view of one of the release bars.

Figure 35 is a fractional perspective view of one of the edge walls.

Figure 36 is a section of a part of the press taken on the line 36—36 of Figure 1 showing the compartments in readiness to receive the stock.

Figure 37 is a similar view illustrating the compressing operation.

Figure 38 is a perspective view of one of the guide pins used in conjunction with the release bars of Figure 34.

Figure 39 is a horizontal section on the order of Figure 36, showing the press as having been opened after the compressing operation.

Figure 40 is a plan view of one of the double entering heads.

Figure 41 is a side elevation of the double entering head of Figure 40, parts being broken away to clarify the internal construction.

Figure 42 is a front elevation of the double entering head.

Figure 43 is a section taken on the line 43—43 of Figure 41, particularly illustrating the mode of clamping the press cloths.

Figure 44 is a horizontal section taken on the line 44—44 of Figure 41.

Figure 45 is a detail view illustrating one of the rod levers and showing the canted position which the connected drainage head assumes during the initial filling of a press box.

Figure 46 is a similar view showing how the drainage head is pressed back when compression commences.

Figure 47 is a partially sectional and elevational view of the head block at the right end of the press.

Figure 48 is a side elevation of the head block.

Figure 49 is a plan view.

Figure 50 is a perspective view of one of the head block clips.

Fig. 51 is a perspective view of the valve by which the opening and closing of the press is controlled.

Figure 52 is a diagram particularly illustrating the port connections of the poppet valves.

Figure 53 is a diagram of the foregoing control valve and its connections with the main, auxiliary and reverse cylinders of the press.

Figure 54 is a side elevation of the cake release operating mechanism.

Figure 55 is a diagrammatic sectional view of the control valve of said mechanism, showing the connections with the pressure cylinders of said mechanism.

Figure 56 is a section taken on the line 56—56 of Figure 4, particularly illustrating one of each of the auxiliary and reverse cylinders.

Figure 57 is a side elevation of the cylinder block casting.

Figure 58 is a fractional side elevation of the cylinder block, illustrating an adjustment of the press for what is herein known as a long "hitch".

Figure 59 is a detail section taken on the line 59—59 of Figure 1.

Figures 60, 61, 62, 62a, 63 and 64 are sectional views illustrating the system and particularly showing the mechanism at various important stages between the loading of the press compartments and the extraction of the finished cake.

Figure 65 is a sectional perspective view of the linkage of one of the linkage chambers (Fig. 39) at the front of the press.

Figure 66 is a section on the line 66—66 of Figure 36.

Figure 67 is a section taken substantially on the line 67—67 of Figure 66.

Figure 68 is a section taken on the line 68—68 of Figure 16, the key bars being omitted.

Figure 69 is a section taken on the line 69—69 of Figure 24, particularly showing the bottom end gate bars.

Figure 70 is a section taken on the line 70—70 of Figure 26.

Figure 71 is a section taken on the line 71—71 of Figure 70.

Figure 72 is a section taken on the line 72—72 of Figure 70.

Figure 73 is a section taken on the line 73—73 of Figure 41.

Figure 74 is a diagram illustrating the means for flushing and heating the press units.

The herein disclosed press is a part of a system for the extraction of liquid from liquid-bearing substances. The substance herein used for example is cooked cotton seed meal or meats.

This system includes as its other parts a certain feeding apparatus for extruding presses disclosed in Patent 1,950,426 of March 13, 1934 to Wilson A. Wilhelm, as well as a cake stripper disclosed in Patent 1,893,854 of January 10, 1933 also to Wilson A. Wilhelm. These various mechanical elements are so disposed in reference to each other that one serves the other, and that with the exception of a single workman, no human agency is needed to handle or otherwise supervise the meal from the first to the last stages of treatment.

To this end the meal carriage is charged with cotton seed meal from a distributor which previously received the meal from a cooker, the carriage then serving to mechanically charge the press with the proper amount of meal, cut off the surplus, whereupon the press is telescoped to extract the oil. Upon again opening the press the stripper is brought into position over the press to strip the cakes from the press cloths and to remove the cakes from the press for subsequent disposal, leaving the cloths in and fastened to the press.

Figure 1 affords a general aspect of the front of the press. Figures 60 to 64 are a diagrammatic representation of the system. Figure 1 may be read in conjunction with the meal carriage of Patent 1,950,426 in order to see how the whole press is intended to be charged at one time. The lower part of the meal carriage is generally indicated in Figure 1.

A description of the system follows that of the press in order that attention may first be given to the details of the press which must necessarily be known in order to fully comprehend the system. A better understanding of the press will be had by considering each of its components, and for this purpose the description is divided into the cylinder block 1 (Fig. 1) with its reverse cylinders 2, 3 (Figs. 3 and 4) and with its rams 4 (Fig. 5), the ram block 5 (Figs. 1 and 8), the head block 6 (Figs. 1 and 47), the press boxes 7 (Figs. 1 and 10), bottom end gates 8 (Figs. 12 and 25), top end gates 9 (Figs. 11, 22), the double entering head 10 (Figs. 40 and 41), the cake release operating mechanism 11 (Fig. 1), the control valve mechanism 12 and 13 (Figs. 51 and 54) by which the respective functions of the reverse cylinders 2, 3 and rams 4 are carried out as well as those of the cake release operating mechanism 11, and a résumé of the operation.

Before beginning this description it is notable that the press assumes a horizontal position (Fig. 1) thus distinguishing from the characteristic vertical or upright posture of known presses in this category. There is a number of well defined reasons for this disposition of the press, principal among which is the quick and simultaneous charging of all of the press boxes and the capability of simultaneous stripping and removal of all of the finished cakes by mechanical means. The individual manual handling of the stock before and after compression is eliminated.

The meal carriage of Patent 1,950,426 is a necessary concomitant to the press because it is by its instrumentalities that the simultaneous charging of the press is made possible. Without the provision of the meal carriage the horizontal disposition of the press would be devoid of the dispatch with which the stock can be handled. Without the provision of the cake stripper it would be practically impossible to extract the finished cake from the horizontal press. There is, therefore, a direct combination between these various elements, and by way of introduction a brief description of the meal carriage follows:—A description of the meal distributor and cake stripper is incorporated in the description of the system.

There is a plurality of cans 14 (Fig. 1) that is brought into position over the press boxes 7. Horizontal series of crank arms (not shown), capable of common operation by connecting rods (not shown), are adapted to open the gates (Fig. 60) thus to discharge blocks or sections of stock into the press boxes 7. (See Patent 1,950,426.)

The operator will work from the bottom of the meal carriage toward the top, that is to say, he will first shift the bottom rod, then the next rod and so on toward the top of the meal carriage. Horizontal series of stock sections (Fig. 60) are thus dropped into the boxes 7. After the boxes are fully loaded and the bottom series of gates (Fig. 60) closed by reversing the bottom rod so as to clip or cut off the surplus stock, (Fig. 61) the carriage is moved away from the press whereupon the functions of the press are made to begin by operation of the valve mechanism 12 (Fig. 51).

The cylinder block 1 comprises a casting (Fig. 3) in which a pair of main cylinders 17, 18 is combined with auxiliary cylinders 19, 20. The act of compression which occurs by the telescoping of the entering heads, of which the double entering heads are representative, into the press boxes 7 is accomplished by the initial introduction of fluid at a relatively low pressure into each of the cylinders 17, 18, 19 and 20, then at a relatively high pressure into the cylinders 19, 20 and finally at said relatively high pressure also into the cylinders 17, 18 so that the compressing operation is finished at the last high pressure.

There is thus a stage-application of fluid pressure. While the gradual application of the pressure is a desirable result yet the outstanding advantage of an initial high-volume low-pressure application of the fluid is an avoidance of the sudden draining and dropping in pressure of the hydraulic system. This can be better understood by considering Figure 53 which comes under the head of the control valve mechanism.

Here is an accumulator 21 in which a fluid pressure head is built up during the reversal of the press. The working low pressure arbitrarily selected is 50 lbs. per square inch, although this may be more or less in practice. If the large volume of fluid demanded of the accumulator 21 for initial introduction into the cylinders 17 to 20 (Fig. 3) were required to be applied by the high pressure pump 22, the latter by virtue of its inherent nature would be unable to build up the requisite pressure behind the large volume of fluid quickly enough to suit the requirement of speed.

So by abstracting a relatively large volume of fluid from the accumulator 21 at the beginning of compression with a consequent initial filling of the cylinders 17 to 20 (Fig. 3), the subsequent working of the pump 22 (Fig. 53) will be confined solely to the building up of the pressure and none of its strokes need be wasted in merely charging the cylinders with fluid. Toward these ends the cylinders 17, 18 (Fig. 3) are made larger in diameter than the cylinders 19, 20, the ratio being approximately 14½" to 6".

All of the cylinders 17, 18 (Fig. 5) and 19, 20 (Fig. 56) are approximately the same length, being open at the ends nearest the press boxes 7 and closed at the other ends. The cylinders are stationary while the rams 4 are movable in the horizontal direction to telescope the entering heads and press or receiving boxes 7. The main cylinders 17, 18 are of the same size and are located with their axes in the same vertical plane and on the vertical center line of the press. This has a purpose. The press boxes 7 are vertically elongated to produce a cake 25 of the shape in dotted lines in Figure 3, so by disposing the cylinders 17, 18 one above the other the greatest amount of pressure can be applied to the stock and to the cake. If the arrangement were otherwise the thrust area of the upper and lower rams 4 (Fig. 3) would overlap the extremities of the cake to a far greater extent than shown.

The auxiliary cylinders 19, 20 are also of the same size, but as previously indicated are smaller in diameter than the cylinders 17, 18. The particular grouping of the cylinders disclosed makes it possible to locate the smaller cylinders in the recesses occurring at the sides of the larger cylinders, enabling a sturdy and compact form. The symmetrical disposition of the cylinders also enables a more uniform application of the pressure, although an outstanding reason for dividing the application of pressure among four cylinders rather than among a lesser number, is to avoid the making and machining of larger masses of metal as well as to avoid the possibility of running into imperfect portions of hide from which certain crimps 23, 24 (Figs. 5 and 56) are made.

The cylinder block 1 has a large band or heavy flange-like projection 26 encircling the open end (Figs. 2 and 57). This band is provided with pairs of longitudinal recesses 27, 28 (Figs. 6 and 57) for the reception of the left ends (Fig. 1) of pairs of press columns 29, 30 respectively at the front and rear of the press. These columns are parallel to each other in all respects.

Outer and inner ribs 31, 32 extend along the front and rear sides of the cylinder block 1 (Figs. 3 and 57), merging with the band 26 at the right end and with a smaller surrounding band 33 at the left end (Figs. 5 and 57). The bands 26, 33 surround the whole group of cylinders 17 to 20, the particular purpose of the band 33 being to strengthen or reinforce the cylinders at the points where the side walls unite with the left end wall (Fig. 5). The largest band 26 has two purposes, first to provide a "hitch" for the press columns 29, 30 and to adequately reinforce the open ends of all of the cylinders and obviate the tendency to break out the metal should the rams 4 exhibit a tendency to gyrate.

The outer and inner ribs 31, 32 distribute the pull of the press columns 29, 30 throughout the whole cylinder casting 1. These ribs are connected by major and minor fins 33^a, 34 (Figs. 6 and 57). The former are flush with the edges of the ribs 31, 32 (Fig. 57). The minor fins 34 are set back so that the front and rear edges are flush with the recesses 27, 28 (Fig. 6) thus affording rests for the columns 29, 30 when these assume the short "hitch" depicted by Figure 1.

When the columns 29, 30 are anchored to the cylinder casting 1, whether on the foregoing short "hitch" (Fig. 1), or on a long "hitch", (Fig. 58), the front and rear surfaces of the columns come flush with the edges of the longitudinal ribs 31, 32, presenting a smooth surface for securing channel sections 35 which provide partial closures for the chambers therebehind as well as mountings for certain filler blocks 36 (Figs. 1 and 58) which are changeable in position for a conversion of the press from the short to the long hitch. Plates 37, secured over the recesses 27, 28 to adjoining portions of the band 26, assist in retaining the columns 29, 30.

The lowermost ribs 31 (Figs. 1 and 3) comprise a bed plate of the cylinder block 1 for which channel sets 38 provide rests. These channel sets are supported by a pier 39 which composes part of the foundation (Fig. 1). On a somewhat similar principle the top ribs 31 provide supports for a certain elevator ram guide 40 which is to be identified with the cake stripper of Patent 1,893,854. This elevator guide has similar parts near each end of the press, those parts at the left end being secured to an I-beam 41 which has short I beam sections or legs 41^a resting on the top ribs (Fig. 3).

At this point it may be well to explain the meaning of the terms short and long "hitch". Figure 1 illustrates an adjustment of the press for a short hitch. Figure 58 illustrates an adjustment for a long hitch. Each column 29, 30 is equipped at its left and right extremities with T-heads 42, 43. These heads provide shoulders 44 which (for example the head 42) are adapted to rest either against the filler blocks 36 in the case of the short hitch (Fig. 1) or against the left wall of the band 26 in the instance of the long hitch (Fig. 58).

When the press is adjusted for a short hitch (Fig. 1) the filler blocks 36 are inserted between the shoulders 44 and the band 26 above and below the columns 29, 30. When the press is adjusted for a long hitch the filler blocks are placed as in Figure 58. In either case bolts 45 are employed to hold the blocks in the desired positions, the channel sections being bored with holes at appropriate places to accommodate the different adjustments. When the filler blocks 36 are placed behind the heads 42 in the long hitch adjustment, the points of heavy screws 46 (Fig. 58) carried by the major fins 33 are brought to bear against the central ones of the filler blocks 36 in order to remove all looseness in the connection.

The long hitch is merely an expressive term for an adjustment or lengthening of the press to accommodate one or more sets of press box and double entering head units 7 and 10. Generally the press will be supplied to the mill with a short hitch adjustment, that is to say with a predetermined number of box and entering head units which in the instance of Figure 1 comprise six of each. Now should it be desired to install an additional press box and double entering head unit to increase the capacity of the press the chief requirements are to readjust the filler blocks 36 (Fig. 58), when the apparently increased length of the columns 29, 30 will exactly accommodate the additional box and head, and to rebuild a part of or add to the foundation to enable moving the head block 6 (Fig. 1) fur-

ther toward the right. By this principle it is possible to lengthen the press by more than one box and head unit, although the instant press is designed for only one extension.

The reverse cylinders 2, 3 are stationed at the front and rear of the cylinder block 1 (Fig. 3) being held in place by clips 47 or their equivalents as well as terminal blocks 48 (Fig. 56) which are made to constitute the heads of the reverse cylinders. The opposite ends of the cylinders are closed by caps 49. These are bridged by a manifold 50 (Fig. 2) respectively with inlet and exhaust valves 52 and 53 (Fig. 1). The valve 52 will be open to pressure only when it is desired to close the press in order to recede the ram block 5 (Fig. 5) from the cylinder block 1 thus to make the exposed ends of the rams 4 (Figs. 3 and 5) accessible for the purpose of removing the crimps 23, 24.

In the ordinary operation of the press the sole purpose of the reverse cylinders 2, 3 is to open or separate the press box and double entering head units 7, 10. This is accomplished by introducing pressure fluid into the right ends of the cylinders 2, 3 through ports 65 which have communication with the cylinders through the terminal block 48 (Fig. 56) and are connected by a manifold 66 (Fig. 53) for an equal supply of fluid. Pressure thus applied for the opening of the press is also applied to the right ends of the rams 4 (Figs. 5 and 56) by means of a ram block 5, thereby driving them back in their cylinders 17, 18 and 19, 20 (Fig. 3) and causing the pressure fluid to return to the accumulator 21 (Fig. 53).

The reverse cylinders are, therefore, the means for opening the press and returning the inactive or residual fluid to the accumulator. When pressure is applied to the rams 4 for the closing of the press, or the performance of the act of extraction, an escape of fluid ahead of the reverse pistons 54 (Fig. 56) occurs to an open pump tank 67 (Fig. 53) by way of the control valve mechanism 12 to be described later.

The rams 4 of the cylinders 17, 18, 19 and 20 (Fig. 3) were previously alluded to in a general way because of the collective function that they perform in acting against the ram block 5 (Figs. 5 and 56) in closing the press. However, the rams of the main cylinders 17, 18 and auxiliary 19, 20 have allied structural differences which are explained thus:—

Taking the rams 4 of the main cylinders 17, 18 first, it is to be observed (Fig. 5) that each has a recess 68 in the leading end to receive a corresponding boss 69 on an extension 70 which is diametrically reduced to match the smallest diameter of a peripheral bevel 71 on the leading edge. The purpose of this bevel is to uniformly expand the inner component of the crimp 23, immediately following the renewal of the crimp prior to which the respective ram was moved back to the limit in the main cylinder.

The extension 70 is secured to its ram by means of stud bolts 72, the nuts 73 of which are sunk in a recess 74 so that the outermost ones will at most be flush with the working surface of the flanged end 75. The flange 75 limits the inward movement of its ram 4 in respect to the main cylinder. This being the case, it is to be observed that the line of demarcation between the ram and its extension 70 is well forward of the position of the crimp 23.

There is never any possibility of the edges of the crimp 23 becoming burred by the passage of the dividing line over its inner component. In addition to the advantage which the position of the division line between the ram and its extension 70 has in respect to the crimp 23 a more important advantage follows. The specific arrangement is disclosed in Figure 5.

This has to do with the renewal of the crimp 23. Renewals are comparatively rare, but they must be made at times. Under such circumstances temporary use will be made of the reverse cylinders 2, 3 to close the press as brought out before, in order to drive the ram block 5 (Fig. 5) clear of the working faces of the extensions 70. There is now ample room for the operator to work between the extensions 70 and the ram block 5 to remove the nuts 73 (Fig. 5) and pull each extension 70 away from the ram 4.

The ram 4 is left in its respective main cylinder and is pushed all the way so that the leading end clears the crimp 23. The space 76 (Fig. 5) between the inner ends of the main cylinder and ram is provided for this purpose. Upon the replacement of the old crimp with a new one the operator will simply pull the ram 4 forwardly by taking hold of the stud bolts 72. The bevel 71 makes a smooth passage of the leading end through the new crimp 23 without injury to the edges. The extension 70 is now replaced and the nuts 73 screwed home.

In addition to matching the smallest diameter of the bevel 71 the reduction in diameter of the extension 70 from that of the ram 4 has the rather important advantage of obviating the possibility of damaging the inner edges of the extensions by virtue of contact with the right edge of the main cylinder should there be any slight misalinement of the stud bolts 72 or a possible inadvertent shifting of the extension in putting it back on the stud bolts. In other words, the diametrical reduction of the extension 70 well avoids the cylinder wall so that should there be any slight portion overlapping the leading edge of the ram there will be no possibility of its hanging against the edge of the cylinder on the inner movement of the ram during an opening of the press.

There is a similarity in the rams 4 of the smaller and auxiliary cylinders 19, 20 (Fig. 56). The leading end of each of these rams is bevelled at 77 in order to pass the crimp 24 without damage under a circumstance similar to that already mentioned. This end of the ram is tapped at 78, or made with some equivalent provision, for the application of an implement by which to pull the ram outwardly after renewing the crimp. It will be understood that for such purpose the ram has to be pushed back in the space 79 so that the leading end clears the crimp 24 for access.

From this it will be understood that the rams 4 have only to be pushed back in the respective cylinders in order to renew the crimps 23, 24, bearing in mind of course that in the instance of the main ram it is first necessary to remove the extensions 70 (Fig. 5). This simple performance can be accomplished in a very short time and distinguished from the laborious and hazardous operation of renewing crimps in known presses of this type which necessitates not only the removal of the ram and ram block but the jacking up of all of the boxes and possibly the removal thereof from the press.

The ram block 5 is that element of the press through which the working thrust of the main and auxiliary rams 4 (Figs. 5 and 56) is transmitted to the stock through the successive entering heads 10 and press boxes 7 for an extraction of the oil. The ram block is shaped (Fig. 8)

to provide full bearing surfaces for the right ends of the rams. The horizontal, auxiliary rams 4 which work in positions quite beyond the front and rear edges of the cake 25 (Fig. 3), exert their thrust on a reinforcing cross rib 80 (Fig. 8). All of the pressure is concentrated on the ram block 5 and transmitted thereby as already pointed out.

The ears 63 with which the reverse piston rods 57 are connected are reinforced by webs 81 (Fig. 8) which combine with brackets 82 in the square holes 83 of which the shanks 84 of roller forks 85 are secured. The square holes 83 are so placed that the corners of the shanks will point longitudinally and crosswise of the press thus taking full advantage of the greatest cross sectional dimensions for the reinforcement of the shanks. Rollers 86 journaled in these forks ride on a track which comprises a cover plate 87 (Fig. 59) secured along channels 88. The confronting backs of these are separated by spacers 89 through which securing means 90 are passed. A nut 91 (Fig. 59), screwed on the threaded base 92 of the shank 84 enables the vertical adjustment and transverse leveling of the ram block 5. A lock nut 93 on the reduced threaded end 94 of the shank secures the adjustments.

The brackets 82 with their carried parts of the ram block 5 are identical with similarly designated brackets and their carried parts carried by the succeeding press boxes 7 and entering heads 10. Each of these parts is thus equipped with a pair of rollers 86. These rollers run on the track 87, 88 in the closing and opening movements of the press.

In order to more readily equalize the increasing pressure on the succeeding press boxes 7 and entering heads 10 in the telescoping of the press the axes of the rollers 86 are located in a horizontal plane which bisects the transverse pressure area which is distributed over the cakes 25 (Fig. 3). In other words, the common horizontal plane in which the roller axes are located cuts the pressure area as spread over the cakes exactly in half.

It is immaterial to the balancing and equalization of the press boxes 7 that the preponderance of the weight is below the rollers 86 (Fig. 1). The important factor is the vertical centering of the pressure area on the axial plane of the rollers. The reader can understand that this will enable a free rocking motion of the press boxes 7, with the result that when pressure is applied the press boxes will at once line up in true perpendicular positions so that the stock is put under uniform compression. The equalizing function also obtains in the entering heads 10, these being equally concerned with the pressure area mentioned before.

Each of the four corners of a frame 95 which appears as an extension from the body of the ram block 5 (Fig. 3), is provided with link pockets 96 by which the ends of links 97 are slidably received. There are corresponding pockets 96 on each of the succeeding press boxes 7 and entering heads 10, and in all instances these parts as well as the connecting links are denoted by corresponding reference characters.

Heads 98 on the ends of the links couple the press boxes 7 and entering heads 10 so as to limit the separation on the opening movement of the press but more particularly to cause the press boxes and entering heads to follow each other when the opening force is applied to the ram block 5 by the pistons of the reverse cylinders 2, 3. The links are inserted sidewise in the pockets 96, and in practice will be retained by cotter pins inserted in holes 99. The inner end of each cotter pin will be bent sufficiently to hold it in place by driving against it with a drift pin insertible in a lateral hole 100 (Fig. 9).

On the working face 109 of the ram block 5, (Fig. 2), that is to say, the face next to the first or adjacent press box 7 (Fig. 1), there is a pad 110 (Figs. 2 and 7) across the upper edge of which there is a formation of hinge knuckles 111 which support a drainage head 112. The pad 110 is slightly smaller than the back side of the drainage head, partly for reason of the necessary accommodation of its hinge knuckles 113 that correspond with the knuckles 111 as well as the accommodation of certain flushing and heating pipe connections 114 (Figs. 41 and 42).

The head block 6 occupies a position at the right extremity of the press (Fig. 1) in confronting relationship to the ram block 5. Thus far it will be understood that it is the motion of the ram block 5 to the right that telescopes the press, in other words the press boxes 7 and entering heads 10, for the extraction of the oil. Of necessity the head block 6 must be stationary in order to act as an abutment for the press boxes and entering heads.

To the latter end the head block 6 is recessed at 101, 102 (Figs. 47 and 49) in a manner similar to the cylinder block 1 to receive the right ends of the columns 29, 30 and provide an anchorage for the T-heads 43. Retaining plates 103 (Fig. 1) keep the columns in place. Clips 104 (Figs. 47 and 50) are tightened down over the T-heads 43 in order to remove back lash as in the instance of the heavy screws 46 of the cylinder block 1. Thus the press is rigidly secured to withstand the pressure set up between the cylinder block 1 and head block 6.

The head block 6 rests upon heavy channels 105 (Fig. 1), placed back to back in pairs as illustrated and mounted on another pier 106 of the foundation. By virtue of the heavy duty imposed on the head block 6 well designed reinforcements are incorporated in its construction. These include heavy ribs 107 (Fig. 48) which are placed longitudinally of the head block so as to withstand the rightward central thrust of the press itself and the opposite leftward pull of the columns 29, 30. From this it will be understood that the ribs 107 adequately reinforce the head block 6.

Formed on the left face of the head block 6 is a pad 108 which has the specific purpose of spacing the nearest entering head 10 from the right face of which the pressure head 112 has been removed (Fig. 1) sufficiently far to the left of the head block 6 so that the roller brackets 82 of that head will not engage the left face of the head block. Should this occur, the central pressure would be apt to fracture the entering head unless this were made undesirably heavy or the front and rear edges of the head block were cut away to receive the roller brackets.

At this point it is to be noted that each entering head 10 has pads 115, 116, respectively at the left and right (Figs. 40 and 42), which appear as outstanding parts on the adjacent faces of the body of the respective entering head 10. These pads of the entering heads are the same in size as the pads 108 (Fig. 47) and 110 (Fig. 2) respectively of the head block 6 and the ram block 5. In the instance of the head block 6 the pad 108 confronts and contacts the pad 116 of the last entering head 10 from which pad the right

drainage head 112 with which all other entering heads are equipped, has been removed as previously stated, for attachment to the pad 110 of a ram block 5.

Thus far it will be understood that the cylinder block 1 and the head block 6 (Fig. 1) constitute solid abutments that are spaced from each other by the columns 29, 30. It is in the space between these abutments that the press boxes 7 and entering heads 10 close and open. The closing movement is aptly described as a telescoping movement, and it is during the telescoping movement that the oil is expressed from the stock.

It has been stated before that the press initially comprises six each of the press boxes and entering heads. Any other multiple might be adopted, provision having been made already for the expansion of the press by one press box and entering head. Since it is a requisite and natural function of the press that each press box 7 shall be confronted by a drainage head 112 (Figs. 36, 37 and 39), it follows that the extra drainage head 112 may well be removed from the right face of the last entering head 10 (right end of Fig. 1) where it is not needed and attached to the pad 110 of the ram block 5 (Fig. 2) where it will act as a plunger for the first press box 7 (left end of Fig. 1).

The reader will thus understand that there will be six identical entering heads 10 in the fundamental equipment. Each of these has a drainage head 112 on its two sides (Figs. 40, 41). But when assembling these entering heads in the press the drainage head 112 is removed from the right pad 116 of the last entering head 10 and mounted on the pad 110 of the ram block 5 at the left end of the press. What then was formerly a set of six so-called double entering heads is now converted into a set of five double entering heads and one single entering head, the latter being identified as the last one at the right of Figure 1 which retains only the drainage head 112 on its left pad 115.

The press boxes 7 have already been generally identified as being the units with which the entering heads 10 alternate. In other words, in the function of the press the press boxes 7 are the female members while the entering heads 10 are the male members. The relationship is well illustrated in fragmentary Figures 36 and 37. These show the various stages in the telescoping action of the press.

Each of the press boxes 7 is of identical construction, and corresponding characters in the following description will be used to denote corresponding parts of each of the press boxes. Consider Figure 10. This is a side view of the press box casting, and the appearance is identical when viewed from either side. There is a central web 117 which takes a position transversely of the press. It extends from front to rear, looking at Figure 1. In other words, it is suspended between the pairs of columns 29, 30, and here it becomes clear that the support is derived from rollers 86 (Figs. 11 and 36) corresponding with those already described in connection with the ram block 5, and similarly mounted as denoted by corresponding characters used in the former connection.

Enlargements 118 (Figs. 10 and 39) have confronting dove tails 119 into which drainage heads 120 are slid from the bottom, for example the points 121 (Fig. 10). These drainage heads are identical with the previously described drainage heads 112 of the entering heads 10 with the exception that they are not as thick or broad. The comparison in size is well illustrated in Figure 36. The reason for the difference is that the drainage heads 112 function as compressing plungers in addition to draining off the oil, while the heads 120 function only as drainage members.

For the details of the drainage heads 112, 120 attention is directed to Patent 1,665,123 granted to Wilson A. Wilhelm April 3, 1928. Briefly described, each drainage head is composed of a multitude of thin bars (Figs. 36 and 41). These are disposed vertically so that the oil may drain downwardly out of channels 122 that are formed by correspondingly grooving confronting sides of the bars near the outer edges (Fig. 39) then reducing or cutting away the bars as at 122^a (Fig. 60) to provide outlets. The arrangement of the grooves produces very fine vertical slits by which the oil enters the channels through covering press cloths 123 (Fig. 36). The bars are riveted together by rivets 124 or otherwise secured (Figs. 36 and 41). The press cloths hang down over the confronting faces of the drainage heads 112, 120, respectively of the entering heads 10 and press boxes 7 (Figs. 42 and 60), the press box cloth being longer than the entering head cloth. The bottom margin of each entering head cloth is approximately flush with the lower edge of the respective drainage head 112 so that it will not interfere with the movement of the entering heads during the extracting operation.

Recesses 125 on opposite sides of each enlargement 118 (Fig. 39) produce ribs 126 adjacent to the dove tails 119. These ribs provide bearings for adjoining parts of edge release walls 127. The purpose of these walls is to provide front and rear closures for compartments 128 (Fig. 36) into which the stock is dropped from the meal carriage.

In order to prevent any of the finely pulverized meal from creeping outwardly past the edges of the walls 127 these are vertically grooved at 129 (Fig. 39) for drainage. Corresponding grooves 130 in the ribs 126 (Figs. 10 and 39) which match during the act of extraction (Fig. 37), provide enlarged channels to take care of the excessive drainage that is likely to occur when the pressure is applied. In practice the grooves 130 might be omitted and the grooves in the adjacent edges of the walls 127 be enlarged sufficiently to serve the purpose.

Each enlargement 118 has lateral flanges 131 (Figs. 10 and 39) to the side edges of which cover plates 132 are applied to assist in forming linkage chambers. The edge release walls 127 complete these chambers (Fig. 39), but unlike the remaining walls of these chambers the walls 127 are movable transversely of the press. In other words they are movable inwardly and outwardly in respect to the cake compartments 128, and the inward and outward movements are produced by the linkage confined in the linkage chambers. The purpose of moving the walls 127 outwardly is to release the edges of the cakes 25 (Fig. 39) prior to the extraction of the cakes by the cake stripper.

Studs 133 (Figs. 13, 39 and 65) are screwed from opposite sides into tapped holes 134 (Figs. 10 and 39) in each enlargement 118. The cover plates 132 are fitted over these studs and are secured by spanner nuts 135 (Figs. 13 and 39) which bind them against sleeves 136 (Fig. 65) and space them from the enlargement 118 to insure the free working of the linkage. The inner ends of the sleeves abut guide blocks 137 (Fig. 65)

through which the studs 133 pass but which are additionally secured by rivets 138 fitted in holes 138a in the enlargement 118 near the holes 134 (Fig. 10).

In addition to the studs 133 and nuts 135 the cover plates 132 have studs 139 to hold them (Fig. 13). These studs are mounted in the edges of the flanges 131. They pass through grooves 140 in these edges, and when the correspondingly grooved cover plates are set on keys 141 fitted in these grooves and secured by spanner nuts 142 screwed on the studs (Figs. 13 and 65) will be adequately held against any possibility of distortion in the early stages of compression (Fig. 37). The keys 141 relieve the studs 139 of the shearing strain which was then set up.

The blocks 137 act as guides in several respects. It is to be observed in Figure 39 that they are set in the recesses 125 flush with the ribs 126, hence coact with the cover plates 132 in guiding the edge walls 127. Incidentaly the blocks are slightly spaced from the ribs 126 (Fig. 39), thus affording a passageway for the dropping out of any substance that may have been carried away from the compartment 128 by the adjacent drainage groove 129.

Another purpose of the blocks 137 is to guide and retain the flanges 143 (Figs. 34, 37 and 65) of release bars 144, the purpose of which is to release the edge walls 127 from the cake 25 by means of the linkage previously alluded to and presently described. In releasing the walls 127 from the edges of the cake the linkage tends to pull the walls 127 and bars 144 together. Since all of the separating motion should be confined to the walls 127 it follows that the blocks 137 function to receive the inward thrust of the flanges 143, hence serve as retainers.

In order that this inward thrust might be equalized along the left and right sides of the release bars 144 the heads 145 of guide pins 146 (Figs. 38, 65) are positioned at places beside a rib 147 (Fig. 37) running longitudinally of each release bar 144 as does the flange 143. The guide pins 146 are set in holes 148 in the cover plates 132 in which they are prevented from turning by virtue of the rectangular nature of the heads.

A further purpose of the blocks 137 is to guide the rollers 149, 150 (Figs. 65 and 66) mounted on trunnions 151, 152 of each of a plurality of links 153. These links comprise the major parts of the linkage mentioned before as between each edge wall 127 and release bar 144. The release bars 144 are capable of vertical motions only, and when moving either up or down, respectively to shift the edge walls 127 toward the compartments 128 or release the edges of the cake 25, ride on the outer vertical edges of the blocks 137.

These motions of the release bars 144 produce motions of the edge walls 127 which, however, are only horizontal. They are guided in these motions by the rollers 150 which work in spaces between the blocks 137. There is a series of the blocks and the rollers 150 are guided therebetween. In the closing movements of the edge walls 127 the thrust of the rollers 150 is exerted on the lower edges of the blocks 137, while in the opening or edge release movement the thrust is exerted on the top edges.

To these ends each release bar 144 and its coacting edge wall 127 has hinge knuckles 154, 155 (Figs. 34, 35) in which the journals 156 of each link 153 are mounted (Fig. 36). These journals terminate in pins 157 to receive a complementary link 158 (Figs. 26 and 33). The pins 157 are located eccentrically in respect to the end of the journals 156, thus to afford maximum strength at the ends of the complementary link 158.

Thus far it will be understood that the release bar 144 (considering only one for the instant purpose) has a vertical series of hinge knuckles 154 (Fig. 34) which confronts (Fig. 26) a similar series 155 on the edge wall 127 (Fig. 35). These knuckles are connected by the links 153. Up and down motion is imparted to the release bar 144 in order to move the edge wall 127 in and out in respect to the compartment 128 (Fig. 39). These movements of the release bar 144 are obviously transmitted by the links 153, but were it not for the blocks 137 the edge wall 127 would not be guided as required.

The rollers 149 (Fig. 66) on the links 153 are confined to the vertical tracks which the outer edges of the blocks 127 afford, while the rollers 150 are confined to the horizontal tracks which the confronting edges of the blocks afford. Thus the reader will understand that when the release bar 144 is pulled down from the position in Figure 26 to that in Figure 24 there will be a horizontal outward riding of the rollers 150 between the blocks 137 and a vertical downward riding of the rollers 149 over the outer edges. The edge wall 127 is thus retracted from the compartment 128 (Fig. 39) or in other words, the edge of the cake 25 becomes released. The outward movement of the edge wall 127 is limited by the engagement of the wall with the spacer sleeves 136 (Fig. 24) which thus serve as stops.

Resuming the description of the walls 127 and release bars 144, it is observed that each of the former has a series of bosses 159 (Fig. 35) from which the knuckles 155 extend. The concavities 160 of these bosses match the holes in the knuckles 155. When a journal 156 is fitted in the hole, the continuous rounded back of the link 153 will rest in the concavity 160 and thus afford a long bearing which is adequate to withstand the outward thrust on the edge wall when the stock undergoes compression (Fig. 37).

For the same reason the release bar 144 has a series of concavities 161 (Fig. 34). These concavities extend to the outer face of the flange 143 where openings 162 extend to the edge of the flange principally to enable the insertion of the links 153 but also for the occupancy of the rollers 149 when the link assemblage has been completed. The rollers 149 preferably should not have bearing on the edges of the openings 162, the bearing being confined to the vertical edges of the blocks 137 as already brought out. The openings 162 are nothing more than cuts into the flange 143, mainly to enable the insertion of the links 153 in the first place.

There is a purpose in sinking the concavities 160 of the edge wall 127 (Fig. 35) in the outstanding bosses 159. The top and bottom portions of these bosses especially the top portions, are slanted so that any oil accumulating thereon will be shed toward the links 153 and run down on the adjacent journals 156 when the links assume the angled position in Figure 24, to be carried into the long bearing when they reassume the horizontal position in Figure 26. Although the present application is not encumbered with the showing of any means for the lubrication of the linkage, yet in practice there will be the provision of some means for conveying some of the cotton seed oil to this part of the mechanism so that there will never be the want

of a lubricant and cleanser for the working parts.

A careful proportioning of the parts obviates the need of any securing means for the complementary link 158 on its pins 157 and of the rollers 149, 150 on their trunnions 151, 152 other than that afforded by the cover plate 132 in each instance. The longitudinal dimension of the links 153, that is from the faces of the trunnions to the faces of the pins, is but little less than the distance between confronting faces of the enlargement 118 and cover plate 132, hence it follows that when the otherwise loose rollers and complementary links are put in place they will be kept there when the cover plate 132 is secured.

Upright ribs 163 (Figs. 10 and 39) represent the widest dimension of the press box 7 in the transverse direction of the press, with the exception of the brackets 82. The edges of these ribs run close to the insides of the tracks 87, 88 and columns 29, 30 although they do not ordinarily rub thereagainst. Should there be any tendency toward the deviation of the press boxes and entering heads from a substantially true longitudinal axis the amount of deviation would be limited by the engagement of the ribs 163 with the tracks and columns.

These ribs are pocketed at 96 (Fig. 10), as previously described relative to the ram block 5 (Figs. 8 and 9), for the reception of the coupling links 97 (Fig. 1), previously described as coupling each of the press units. Immediately to the inside of each of the ribs 163 there is a vertical duct 165 (Figs. 10 and 39) for the purpose of supplying a bore 166 with oil.

A connection 167 from a suitable main 168 (Fig. 10) joins each of the ducts 165. This main leads from a suitable reservoir 168[a] (Fig. 74) in which the extracted oil is collected and from which the oil is conducted for flushing purposes by a suitable pump 168[b], which supplies the necessary pressure. Heat is imparted to the oil either in the reservoir or along pipe 168 by any suitable means, for example a steam coil 168[c] located in the reservoir. A similar provision is made in the instance of each entering head 10 (Fig. 41), although here the ducts are substituted by pipes 165[a] which are embedded in the respective drainage head 112 by cutting away enough of the back edges of the bars composing the head. These pipes are made to communicate with a manifold 165[b] (Fig. 43) in the respective drainage head 112.

In the instance of the drainage heads 120, the smallest and innermost reduction of each pair of the bores 166 (Fig. 10) is made to communicate with manifolds 169 (Figs. 13 and 19) by way of leaders 170. Each manifold is the composite of a groove across the bars of the drainage heads 120 where it can intersect the drainage channels 122 (Fig. 19) and a groove in the underside of a top abutment 171 (Fig. 19) of the adjacent drainage head.

One of the purposes of the foregoing ducts 165 and pipe 165[a] is to initially introduce hot oil under pressure into the manifolds 165[b] (Fig. 43) and 169 (Figs. 13 and 19) respectively, of the entering drainage heads 112 and the press box drainage heads 120 so that the drainage heads may be flushed and heated after the press has been left standing until cold. A second and important purpose thereof is to introduce flushing oil into the drainage heads during the act of extraction.

There is a time during the foregoing period of operation of the press when the low pressure bars of certain bottom end gates are caused to drop when the act of extraction is well under way. At this time there will be a comparatively heavy surge or large volume of oil that must find egress from the drainage heads. This egress, in the instance of the entering drainage heads 112 is afforded by dropping the low pressure bars at the time stated, and it is during the period subsequent to the dropping of the low pressure bars that flushing oil is introduced from the main 168 to assist in carrying off the residual oil of extraction as well as any particles of substance that might tend to remain in the drainage channels by virtue of a lack of inherent pressure in the oil being extracted.

Reverting to the top abutment 171 (Fig. 19), this extends between the ribs 126 (Fig. 10) of the press box 7. It will be remembered that these ribs are dove-tailed at 119 (Fig. 39). The ends of the top abutments 171 are correspondingly dovetailed in order to make a close fit with the ribs. Studs 172 (Figs. 18 and 19) are used to secure each top abutment 171 to the web 117 of the press box 7. Each drainage head 120 will be slid upwardly between the ribs 126 until stopped by the top abutment 171 which fixes its ultimate position. Each drainage head is then secured by one of a pair of retainer bars 173, riveted to the web 117 through holes 174 (Fig. 10), these bars being narrow enough (Fig. 60) to provide an ample outlet both for the oil under extraction and the subsequent flushing oil.

The ducts 165 to which reference has been made communicate with an annular groove 175 (Fig. 13) in each of a pair of hinge pins 176 that are screwed into the bores 166. A wrench is applied to the non-circular ends 177, and the pins are held in place by lock nuts 178. A passage 179 through the center of each hinge pin 176 conducts the oil to the inner extremity of the respective pin, whence it is discharged into the manifolds 169 as already brought out.

Confronting rabbets 180, 181 (Fig. 19) define a pocket by which the hem 182 of each press cloth 123 is received. The rabbets are formed in each top abutment 171 and its coacting clamp 183 which, when secured by bolts 184 fitted through holes 185 in the web 117 (Fig. 10), secures the press cloth in the suspended position in the respective compartment 128 (Fig. 18).

That portion of the press box 7 engaging above the top line of the cage 25 (Fig. 10) may be known as a superstructure which at its upper extremity terminates in a T-head 186. This T-head has parallel bores 187 (Fig. 10) for the reception of hinge pins 188 (Fig. 14) on which key bars 189, 190 are hinged (Figs. 14 and 23). Kerfs 191 receive the hinge knuckles 192 of the key bars. The kerfs are staggered (Fig. 14) to avoid weakening the metal, but the key bars 189, 190 are interchangeable with each other nevertheless.

The web 193 of the superstructure (Figs. 10 and 16) is actually a continuation of the central web 117 (Fig. 10). It is provided with a plurality of slots 194 (Figs. 10 and 68) for the pocketing or nesting therein of reinforcing ribs 195 running across certain top end gate bars 196, 197 when these assume the open position (Fig. 17). The front and rear ones of these slots are of single widths to receive the single ribs 195 on the diagonally opposite ends of the two top end gates while the other slots are of double widths to permit the nesting therein of the remaining

ribs which are properly offset for the purpose (Fig. 68).

At the front and rear the web 193 (Fig. 10) merges with the top of what is aptly known as posts 198 (Fig. 16). These posts are actually upward extensions of the enlargements 118. In other words, the enlargements extend above the cake line and before meeting the webs 193 are rounded off as shown so that the heels 199 (Fig. 15) of the top end gates can swing thereover to the open position. It is in the posts that the bores 166 are formed for the reception of the hinge pins 176.

These bores are centrally located in respect to openings 200 in the posts 198 (Fig. 10). Each top end gate has knuckles 201 at its extremities (Fig. 22). Pairs of these knuckles are fitted in the openings 200 and hinged by the pins 176. Since the top end gates are identical with each other and pairs of the knuckles 201 are fitted in each of the openings 200 it follows that the top end gates will be offset (Fig. 68) the thickness of one knuckle in the front to back direction of the press. This relationship is well shown in Figure 68 from which the amount of the offset can be understood. Figure 14 may be read in conjunction with Figure 68 for an understanding of the relationship of the key bars 189, 190 to the top end gates 196, 197. The front and rear ends of these coacting key bars and top end gates coincide.

Brackets 202, provided in pairs at the front and rear of each press box 7 and standing out from slightly heavier extensions 203 of the web 117 (Figs. 10 and 29), provide the supports of certain bearing blocks 204, 205 (Figs. 28 and 32). Elongated holes 206 (Fig. 25) receive the studs 207 of these bearing blocks and admit of limited adjustments of the bearing blocks after loosening the nuts 208 (Fig. 25). A hole 209 through each extension 203 adjacent to the brackets 202 (Fig. 10) is adapted to receive a bolt 210 (Fig. 25) which is part of the block-adjusting means.

Bearings 211, depending from the brackets 202 (Fig. 10) provide the supports for a shaft 212 (Figs. 4, 12 and 25). This shaft carries corresponding cranks 213, 214 at the respective front and rear ends (Figs. 1 and 4) at places close to the outer surface of the bearings 211. An extension of the shaft beyond the front crank 213 (Fig. 4) carries a third crank 215 which at its extremity supports a roller 216 (Figs. 1 and 4) that rides in the channel formed by properly matching a pair of Z bars (Figs. 1 and 4) of the cake release operating mechanism 11.

At present it is sufficient to say that the bars 217 are capable of raising and lowering movements thus to rock the shaft 212. It should be understood that all of the six shafts 212 will be rocked simultaneously, but it will be remembered that the instant description is confined to a single press box. So by rocking the shaft 212 there will be a corresponding rocking of the cranks 213, 214 with a corresponding raising and lowering of a pair of control guides 218, 219 respectively at the front and rear of the press (Figs. 4 and 24). These control guides are identical, the front and rear construction of one being well shown in Figures 30 and 31. It is by means of these guides that the release bars 144 (Fig. 39) are raised for the inward movement of the edge walls 127 to the closed position (Figs. 26 and 36), lowered (Fig. 24) for the retraction of the edge walls 127 from the compartment 128 (Fig. 39) and released therefrom from the vertical edges of the cake 25.

The release bars 144 are provided in pairs at the front and rear of the press box (Fig. 39). Their major lengths are pocketed and slidable in the recesses 125 as already understood. But beyond that the release bars have offsets 220 (Figs. 24 and 66) the extensions 221 of which occupy and slide in parallel grooves 222 of the control guides 218, 219, which, in turn, are thus guided by the extensions. Each control guide has a lug 223 (Fig. 30) with the wrist pin 224 of which (Figs. 12 and 26) the connecting link 225 of the adjacent crank 213 or 214 is joined. Thus it will be seen that the rocking motion of the shaft 212 is simultaneously transmitted to the guides 218, 219 through the medium of the connecting links 225, and ultimately transmitted to the release bars 144.

However, the latter motion is delayed. That is to say, sliding movement of the release bars does not begin with the beginning of movement of the control guides 218, 219. This delay in the sliding response of the release bars 144 occurs both at the up (Fig. 11) and down (Fig. 12) movements of the control guides 218, 219 by which movements the bottom end gates 8 and edge walls 127 are closed and opened.

The delay in the responsive movement of the release bars 144 is caused by the free movement of studs 226 in slots 227 near the extremity of each extension 221. The studs 226 are fixed on the longitudinal center line of each groove 222. The studs occupy the slots when the extensions are fitted in the grooves. A cover plate 228 (Fig. 29) is secured to the division 229 between the grooves 222 (Fig. 30) both by cap screws 230 and nuts on the threaded reduced extensions 231 of the studs 226. The cover lies flush with the edges of the sides of each control guide.

A notch 232 (Figs. 11 and 30) in the division 229 makes room for the rib 163 (Fig. 10) which is extended sufficiently at the bottom to accommodate the heating and flushing connection 167. The back of each control guide 218, 219 is arcuately slotted at 233 (Figs. 30 and 31) for the purpose of slidably receiving segmental blocks 234 (Figs. 12 and 25) which are in the general shape of keystones. These blocks are to be identified with the bottom end gates 8 (Figs. 24, 25 and 69) which, as the name implies, provide bottom closures for the compartments 128. As thus far described the reader will understand that each press box 7 is of a double compartment arrangement (Fig. 69) wherein the fixed central web 117 constitutes the fixed division between the cake compartments 128. These compartments would be without identity were it not for the confronting drainage heads 112 (Fig. 36) of the coacting entering heads 10 or of the edge walls 127 (Fig. 39), bottom end gates 8 (Fig. 25) and top end gates 9 (Fig. 68).

All of these walls, if they might be so called for the instant purpose of description, are movable toward and away from the drainage heads 120 of the press box 7 (Fig. 39), either to open the compartments 128 wide or close them on all sides. When the compartments are opened the next occurrence in the system would be to reach down by means of the cake stripper to loosen the previously compressed cakes 25 from the press cloths 123 to which they are stuck.

The closed position of the press box implies a prior filling with cotton seed meal to be com-

pressed. But the opening and closing of the press boxes, or in other words the opening and closing of the compartments 128 by operation of the various walls occurs on a peculiar order. This is dealt with under the description of the operation, but from what has been said before it will be understood that insofar as the bottom end gates 8 and edge walls 127 are concerned the bottom end gates are retracted from the bottom edge of the cake 25 first whereupon the edge walls 127 are retracted from the vertical edges of the cake by the delayed action for which the slots 227 (Fig. 11) are responsible.

Each bottom end gate 8 comprises a pair of bars 235, 236 (Figs. 25 and 69) located side by side transversely of the press box 7 and herein known as the high and low pressure bars. The high pressure bars are located nearest to the drainage heads 120 and receive the major bottom thrust when the cake 25 undergoes maximum compression (Fig. 62). The high pressure bars remain in fixed positions from the beginning to the end of the extracting operation (Figs. 60 and 62) but the low pressure bars depart from their initially flush positions with the high pressure bars (Fig. 62) as soon as the drainage heads 122 of the entering heads 10 pass inwardly beyond the division line between the bars (Fig. 62). After compression has been completed the bars of both bottom end gates 8 are swung away (Fig. 62[a]) from the respective press box 7 simultaneously with the opening of the press.

These actions of the high and low pressure bars 235, 236 presuppose a relatively sliding motion (Figs. 60 and 62) as well as a swinging motion in respect to a given press box. These motions are made possible by pairs of rocking posts 237, 238 (Figs. 25 and 69) which support and connect the heads 239 at the front and rear of the high pressure bars (Fig. 69) with and upon the bearing blocks 204, 205 (Figs. 25, 32).

It is to be observed (Fig. 69) that the heads 239 are offset in relationship to the high pressure bars 235. This produces what might aptly be termed a recess 239[a] which not only accommodates the lower part of the respective drainage head 120 when the press is closed (Fig. 60) but also accommodates the previously described longer press cloth 123 of the press box. In each instance the press cloth of the press box hangs down clear of the high pressure bar and although the latter presses tightly against the cloth, yet the degree of pressure is limited by the contact of the head 239 with the slightly heavier extension 203 of the press box web 117.

The rocking posts 237, 238 produce a parallel motion of the bottom end gates in respect to said bearing blocks. Relative downward sliding or dropping of the low pressure bars 236 occurs during the closing of the press when pushers 240 in the shape of so-called acorn nuts (Fig. 62) on the entering heads 10 engage trip bars 241 that are pivoted at 242 to the respective low pressure bars and have approximately midway connections with the pivot rod 243 (Fig. 24) of toggles 244.

The low pressure bars 236 drop principally by gravity when the trip bars 241 are moved off center by the pushers 240 (Fig. 62). The purpose of dropping the low pressure bars is to offset them from the deges of the high pressure bars 235 (Fig. 62) and thus afford free communication of the channels in the drainage heads 112 with the outside. The greatest flow of oil and finely suspended meal occurs approximately during initial compression. It is in order to afford a free escape of this liquid substance that the low pressure bars are dropped.

The pivot 242 of each trip bar 241 (Fig. 24) is carried by ears 245 depending from the low pressure bar 236. The pivot 242 is in line with the pivots 246 of the toggles 244. The low pressure bar 236 is supported by the toggles 244. It is slidable in grooves 247 in the heads 239 of the companion high pressure bar 235 (Fig. 69). It will be understood that the relative sliding of the low pressure bar occurs by virtue of the knee action of the supporting toggles 244. Since the trip bar 241 connects at the breaking point to the toggles it follows that a striking of the end of the trip bar by means of the pusher 240 will offset the pivot rod 243 (Fig. 28) so as to enable the low pressure bar to slide downwardly by gravity.

In order to again erect the toggles, which act occurs during the opening of the bottom end gates 8 (Figs. 25 and 62), the adjacent rocking post 237 is equipped with a lug 248 (Figs. 24, 26, 27 and 72) which will strike the extended ends of the pivot rod 243 (Fig. 72) and thereby pull the toggles 244 from the angled position (Fig. 28) to the straight position (Fig. 25). A check device 249, incorporated in the hinge joint of each pair of toggles 244 limits the outward movement.

When the toggles 244 are erected the three pivotal points are thrown out of line (Figs. 25 and 27) in order that the initial pressure imposed on the low pressure bar 236 may be thrown on the check device and the toggles caused to stand without collapsing. If the pivots were left on center the pressure might cause the toggles to collapse at an undesirable time or in the wrong direction.

These pivots include a trunnion 250 (Fig. 72) which extends from the lower hub 251 of each rocking post 238. The opposite end of the hub 251 has a shorter trunnion 252. The hub 253 at the upper end of the post 238 has a single short trunnion 254 matching the trunnion 252. The lower and upper hubs 255, 256 of the companion rocking post 237 (Fig. 71) have trunnions 257, 258 on the latter of which is mounted one of the segmental blocks 234 (Fig. 12) which rides in the adjacent portion of the arcuate slot 233 in one of the pair of control guides 218, 219.

Mention has been made of the bearing blocks 204, 205 as resting on the brackets 202 (Fig. 27). Each of these blocks has concavities 259, 260 (Fig. 32) which afford bearings for the hubs 251, 255 (Fig. 70) of the rocking posts 238, 237. These hubs are fitted under a correspondingly double concaved web 261 and are retained by keepers 262 (Figs. 70 and 71) that are fitted over the trunnions 252, 257 and in turn held in place by long rivets 263.

These rivets fit in a bore formed partly in the flange 264 of each keeper 262 and in the outstanding flange 265 (Fig. 32) of the respective bearing block. This arrangement of fastening means for the keeper 262 avoids the sacrifices of the necessary solidity of the bearing block but more particularly avoids the threading in of screws which might conflict with the bolt 210 (Fig. 25) mentioned before, or with a pusher screw 266 located immediately thereabove.

A bearing arrangement similar to that of each of the blocks 204, 205 is repeated on the nether side of the head 239 of the respective high pressure bar 235. Each head is concaved at 267, 263 (Fig. 70) to afford bearings for the hubs 253, 256 of the

posts 238, 237. Keepers 269, similarly secured as before, retain the rocking posts. Each bearing block 204, 205 is somewhat of an L-shape. That is to say, the concavity 259 (Fig. 32) is longer than the concavity 260. The reason for this is that the latter has only to accommodate the hub 255 (Fig. 71) while the former includes the bottom member of each toggle 244 as well as supports the hub 251 (Fig. 72).

Reverting to the adjustment of the blocks 204, 205, it will be understood from Figure 25 that the points of each set of pusher screws 266 bear against the heavier web extensions 203. Taking the block 204 for example, a loosening of the nut on the bolt 210 and a driving in of the screw 266 would advance the block to the right, whereas a driving out of the pusher screw 266 and a tightening of the nut would move the block to the left.

The main object of these adjustments is to insure the leaning of the tops of the rocking posts 237, 238 toward the web 203 when the press is in the closed position (Figs. 60 and 62). Therefore, when pressure is applied on top of the high pressure bars 235 the bottom end gates are forced toward the central web 117 and the possibility of these collapsing by virtue of the rocking posts kicking out is eliminated.

Thus far it will be understood that the raising and lowering of the control guides 218, 219 (Figs. 24 and 30) is responsible for the closing (Fig. 28) and opening (Fig. 25) of the bottom end gates 8 as well as the foregoing delayed inward (Fig. 36) and outward (Fig. 39) motions of the edge walls 127. The purpose of the delay is to avoid having to work the bottom end gates and edge walls simultaneously at the time of opening and closing the press, although this delayed feature is of especial advantage when initially opening the press. The end gates start opening first and are already in motion before the pull of starting the edge walls 127 commences.

Lowering of the bottom end gates 8 is made to occur by the action of the control guide 218 (using one for example) against the segmental blocks 234 (Figs. 12 and 25). The spreading of the bottom end gates occurs simultaneously with their lowering (Fig. 63). The arcuate slots 233 of the control guide (Fig. 31) define what might aptly be described as a wedge 270. When this wedge enters between the blocks 234 in the lowering of the control guide 218 (Fig. 25), the blocks are spread apart and at the same time carried down with the control guide with a corresponding effect on the bottom end gates. During this action it is not until the studs 226 (Fig. 11) engage the bottoms of the slots 227 in the extensions 221 of the release bars 144 that the latter are slid downwardly, hence the delayed retraction of the edge walls.

Assume the press to be closed. The high and low pressure bars 235, 236 of each bottom end gate 8 will be flush on top. The high pressure bar 235 remains stationary during the act of compression. It is held so by the top inward inclination of the pairs of rocking posts 237, 238 which support it. The inclination of these posts prevents any downward or outward yielding of the high pressure bars under pressure.

The flush relationship of the low and high pressure bars is only temporary. It is maintained by the outwardly "bowed" disposition of the pivots 246, 243 and 250 of the toggles 244. Each trip bar 241 stands in position to be engaged by the pusher 240 of the immediately coacting entering head 10, and as soon as the leading edge of the drainage head 112 of that entering head crosses the line of demarcation between the high and low pressure bars (Fig. 62) the pusher 240 will have reached the trip bar 241 and bowed the toggles 244 inwardly (Fig. 28) so as to drop the low pressure bars (Figs. 28 and 62) for a free escape of the oil, etc. when extraction commences.

It is an occurrence incidental to the proportions of the toggles 244 that the low pressure bars 236 will ride slightly higher than the high pressure bars 235 (Fig. 25) in the open position of the press. This is actually an advantage because the relative motion or rubbing of one bar against the other will in a manner keep the two limbered up and possibly work out any accumulation that might have entered between the top edges. This relationship endures only while the press is open. As soon as it is closed the bars become flush as already stated, and remain so until after the press boxes have been filled and extracting pressure is applied. Thereupon the low pressure bars are dropped and remain so until the bottom gates are again opened.

It may be repeated that the rocking posts 237, 238 are solely for the immediate support of the high pressure bars 235. Although the low pressure bars 236 are carried by the high pressure bars and constitute the other part of each bottom end gate 8, they are independently supported by the toggles 244. This independent support is necessary to accomplish the relative downward sliding or dropping of each low pressure bar which is made to occur by the displacement of the trip bar 241 as already brought out.

The top end gates 9 as indicated previously, serve to close the tops of the compartments 128 (Fig. 62) after these have been filled and while the stock undergoes compression. They comprise the bars 196, 197 (Figs. 22 and 63) which actually constitute the gates. The reference character 9 relates generally to the entire top end gate mechanism.

The manner in which these gates are hinged to the posts 198 (Figs. 16 and 63) by means of the hinge pins 176 (Fig. 13) has been brought out before. The top end gates are operated by hand as distinguished from the bottom end gates and edge walls which are primarily operated by the mechanism 11 (Fig. 1) which, however, is under manual control. The top end gates are opened first and closed last in those periods in the cycle of operation of the press immediately following compression and the filling of the press boxes.

For these purposes the top end gates are equipped with handles 271 (Figs. 14 and 20). A handle is secured at 272 (Figs. 13 and 16) to the front end of each of the key bars 189, 190. From this it will be understood that the handles 271 are accessible to the operator standing in front of the press (Fig. 1).

Each handle includes a bracket 273 (Fig. 20) which is fitted in a rabbet 274 (Fig. 16) in a longitudinal edge of the respective key bar and secured by the means 272. The handles assume positions close to the top end gates 196, 197 when the latter are closed (Figs. 12 and 16), and positions at nearly the highest point of the press (Fig. 1) when the top end gates are open (Fig. 15).

The operator will swing the handles on outward arcs either up or down. This motion is applied directly to the key bars 189, 190 by virtue of the handles being carried thereby, but is transmitted to the top end gates 196, 197 through lifting links 275, 276 which have pivotal connections at 277, 278 with the respective gates and bars. An offset 279 (Fig. 20) in each

bracket 273 receives the approximately mid portion of the respective lifting link in the closed position of the top end gates (Fig. 16). The links are then secured in that position by spring latches 280 (Fig. 21) which engage behind the links. Each latch is operable by a button 231 from the front end of the respective handle 271.

Springs 282, 283 (Figs. 11, 12 and 15) connected between studs 284, fixed on each top end gate for the purpose (Figs. 15 and 22), and an extended portion 285 (Figs. 13 and 14) of each of the hinge pins 188, aid in the lifting of the top end gates 196, 197 and cushion the closing movement so that there will not be an objectionable slap when the end gates are closed. The springs bear a crossed relationship to each other, that is to say, the spring 282 at the front slants up to the left (Figs. 11 and 15) while the spring 283 at the rear (Fig. 13) would slant up to the right. Thus it will be clear that the spring at the front aids in lifting the right hand gate 196 while the spring at the rear aids in lifting the left hand gate 197.

The hinge pins 188 (Fig. 14) will be extended (285) at diagonally opposite points in order to reach the crossed springs. Since the springs must pass the webs 193 the diagonally opposite corners are plowed out at 286 (Figs. 10 and 68). It is to be observed that the lifting links 275, 276 have a generally bowed appearance (Figs. 11 and 12). They are of identical construction and are simply reversed in position when connected between the right and left end gates and key bars.

The purpose of the bowing is to dispose the mid-portions to the inside of or behind the offsets 279 of the handle brackets. This leaves the outer faces of the handle brackets unimpeded for contact with each other (Fig. 15) when the top end gates are lifted or open. Under this condition the gates 196, 197 and key bars 189, 190 stand erect flush with the sides of the T-head 186 as well as flush with the surfaces of the drainage heads 120 of the respective press box, being held so by the springs 282, 283. This leaves a clear and unobstructed passage both for the admission of the cans of the meal carriage prior to filling the press boxes, as well as the later introduction of the cake stripper when the time comes for the abstraction of the cakes from the press boxes.

In order to lock the gates 196, 197 in the closed position (Figs. 16 and 18), the key bars 189, 190 are equipped with feet 287 (Fig. 23) which are adapted to engage the reinforcing ribs 195 of the respective top end gates. Corresponding parts of the feet and reinforcing ribs are bevelled at 288 (Fig. 18) to not only transmit the upward thrust of the top end gates to the key bars more directly when under pressure, but mainly to enable a quick clearance of the reinforcing ribs in the initial opening movement of the top end gates.

It will be understood from the manner in which the top end gates and the key bars are pivotally hung that the initial motion of the key bars will be relatively more rapid than that of the top end gates. In other words the initially outward swinging of the key bars 189, 190 by force of the pressure applied to the handles 271, will be more rapid than the corresponding lift of the top end gates through the medium of the connected links 275, 276.

The foregoing feet 287 are sufficiently offset on the two key bars 189, 190 that they will nest or "shear" together in the open position of the press (Fig. 15). Thus the feet 287 will not present any obstruction, and the flush relationship of the gates, key bar and T-head 186 will not be impaired. At this point it is also well to note that the key bars are recessed at 289 at appropriate places (Fig. 23) to receive necessary protruding parts of the links 275, 276 when the key bars are brought together.

The double entering head 10 has previously been described as the male member which coacts with adjacent press boxes 7 for the compression of the stock and the extraction of the oil. It has also been explained that six of these units are furnished but that in the instance of the last entering head at the right of the series (Fig. 1) one of the drainage heads 112 is removed and mounted on the pad 110 of the ram block 5 (Fig. 2) so that it may there act as the male member for the nearest press box 7. Other details such as are common to all of the entering heads, whether of the ram block 5 or of the last single entering head at the right extremity of the press, have been alluded to before.

But another outstanding feature common to all of the entering heads but not previously described, resides in the means for initially canting the drainage heads 112 until pressure is applied, whereupon the drainage heads are made to settle back upon the pads 115, 116 (Fig. 42), or back against the pad 110 in the instance of the ram block 5 for the purpose of establishing a uniformity in the density of the stock.

To these ends bolts 290, 291 (Fig. 44) are screwed in opposite directions into pockets or recesses 292 formed on the confronting and bottom edges of companion drainage heads 112 by making square cuts (Fig. 73) in the corners of a desired number of the drainage bars.

The bolts are set in position by lock nuts 293. The bolts loosely occupy holes 294 in the upper part of a tail extension 295 of the main body or web 296 of the entering head. The heads of the bolts 290, 291 are stationed in spaced relationship to opposite sides of the extension 295 (Fig. 44) when the stock is under compression, and do not contact the adjoining surfaces of the extensions until springs 297 are free to rock the drainage heads 112 to the canted position (Fig. 42) when the press is in the stock receiving position.

From this it will be understood that during the filling of the compartments 123 (Figs. 60, 61 and 62) the springs 297 rock the drainage heads 112 on their hinges 111, 113 (Figs. 41 and 42) so that the drainage heads assume the canted positions in reference to the respective entering head 10. The heads of the bolts 290, 291 limit the amount of canting. This amount can be adjusted by use of the lock nuts 293. The purpose of thus canting the drainage heads 112 is as follows:—

As previously pointed out, the press boxes 7 of the press stand upright. The stock is fed into the boxes at the top end and in falling, that stock in the bottom of each box is packed harder than that near the top. Should the faces of the box sides be parallel, more stock by weight would lay below the transverse center line than above it, but by canting the drainage heads 112 each box is initially made smaller at the bottom than at the top, thus equalizing the distribution of the stock in each box. The fact of the stock being more densely compacted at the bottom than at the top can be understood when it is borne in mind that the sections into which the falling stock is divided must drop successively farther as the layer is built up in the press boxes. In

other words, the last series of sections will drop farther to complete the filling than will the first series of sections. It is this successively farther dropping that pounds the layers into an increasingly dense mass.

As each entering head 10 advances into the companion press box 7 there will be a simultaneous increase in the density of the stock and a compression of the canting springs 297 until the formerly canted drainage heads 112 lie back against the pads 115, 116 (Fig. 62) in perpendicular positions. The direct result of initially canting the drainage heads is uniform extraction of the oil and an avoidance of pressing the cakes into a shingle shape as well as the avoidance of the tendency to bow the press downwardly in the middle and thus impose unusual stresses on the press columns.

As previously pointed out, the drainage heads 112 of the entering heads are maintained in the canted positions by action of the springs 297 (Fig. 44) while the bottom end gates 8 are closed and during the filling of the press boxes 7. The canting of the drainage heads gradually disappears as the compression of the stock increases. The drainage heads are prevented from assuming the canted positions by the bottom end gates 8 when these are open (Fig. 62a), and the manner in which this is done is as follows:—

The front and rear edges of the tail extensions 295 are socketed at 298 (Fig. 41) to receive the angled ends 299 of rod levers 300, the upper ends of which are likewise angled at 301, but to a lesser extent to hook in the eyes 302 of bolts 303 screwed into the confronting backs of the drainage heads 112 (Fig. 44). The levers 300 are thus pivotally mounted, and swinging of the levers occurs consonantly with the drainage heads when the springs 297 (Fig. 44) are free to expand.

The levers 300 occupy such positions in reference to the rest of the structure that when the bottom end gates 8 are opened (Fig. 63), the low pressure bars 236 will press thereagainst (Fig. 46) and in thus straightening the levers 300 will cause the straightening of the drainage heads 112. In other words, when the entering heads 10 are retracted there will be an accompanying separation of the bottom end gates 8, but since these will reach the tail extensions 295 sooner than there will be such sufficient relaxation on the drainage heads 112 that would enable the springs 297 (Fig. 44) to again urge those drainage heads to the canted position the low pressure bars 236 will reach the levers 300 and hold them, consequently the drainage heads 112, in the perpendicular positions.

It is to be observed in Figures 42, 43 that the faces of the drainage heads 112 are covered with the press cloths 123 previously described. These press cloths are secured at the top edges (Fig. 43) by clamps 183a much on the order of the clamps 183 (Fig. 19). Screws hold these clamps 183a down in recesses across the top of each drainage head. The arrangement is so clearly shown that further description is thought unnecessary.

The cake release operating mechanism 11 is in effect a double-acting jack by means of which the control guides 218, 219 (Figs. 4, 24 and 30) are simultaneously moved up (Fig. 26) or down (Fig. 24) respectively to close or open the bottom end gates 8 and edge walls 127 (Figs. 36 and 39) of the press boxes 7. The up and down movements of the channel 217 (Figs. 1 and 4) cause a simultaneous rocking of the cranks 215 with the result previously mentioned. This action will be imparted to the bottom end gates and edge walls of all of the press boxes 7 regardless of their position in the press.

For example, when the press boxes 7 and entering heads 10 assume the positions of widest separation preparatory to receiving stock (Fig. 60), the action of the channel 217 will be an upward motion to rock the shafts 212, (Fig. 1) to the right and thus close the bottom end gates 8 and edge walls 127. During the following compression, when the entering heads 10 close in on the press boxes 7 and there is a general shortening of the press by virtue of the telescopic action, the rollers 216 will run along the channel 217 toward the right. Now when the time arrives to again open the press there will be a consonant downward movement of the channel 217 (Fig. 1) and rolling toward the left of the rollers 216 as the press boxes and entering heads are separated by action of the piston 54 in the reverse cylinders 2, 3 (Figs. 2 and 56).

A single main and a pair of auxiliary toggles 304, 305 (Figs. 1 and 54) support the channel 217 and cause rectilinear up and down motions thereof. These motions are compelled by stay rods 306 which pivotally connect the members of the toggles 304 with diagonally opposite extremities of the toggles 305. The required arcuate motion of the pivots 307 at one end of the rods (Fig. 54) for the lowering of the channel 217 will bring the rods 306 to the dot and dash line positions from which it will be seen that the pivots 308 at the opposite ends have travelled along vertical lines. The channel 217 thus moves straight up and down.

A crank extension 309 (Fig. 54) of the bottom member of the main toggle 304 has a fixed pin in turning connection with a block 311 that is slidable in the slot 312 of a head 313. This head is fixed on a ram 314 and is slidable on a guide rod 315 when the ram is reciprocated between a pair of cylinders 316, 317 into which the ends of the ram extend. These cylinders are appropriately mounted on a base 318 (Fig. 54) which in practice may be of any desired description. This base includes pedestals 319 on which the toggles 304, 305 are pivotally mounted.

The channel 217 is lowered and raised through the instrumentalities of the toggles and ram 314 by action of pressure fluid, the flow of which into and out of the cylinders 316, 317 is controlled by the valve 13 forming part of the control valve mechanism. This valve may be of any known description, its working requirements being substantially on the following order:—The pivoted handle 320 (Fig. 54) includes a head 321 which is arranged to govern the positions of pairs of valves 322, 323 and 324, 325 (Fig. 55).

The action of the valve 13 is as follows:— A shift of the handle 320 to the right will raise the channel 217 by virtue of the head 321 raising both valves 322, 323 (Fig. 55) whereupon fluid from a source of pressure not shown would enter by way of pipe 326, pass valve 322, flow through pipe 327 across the top valve 324, through pipe 328 to the cylinder 317. The ram 314 is thus displaced to the position at the right, causing an erection of the toggles 304, 305 and a consequent raising of the channel 217 to the position shown. At the same time fluid from the cylinder 316 escapes by way of pipe 329, flows beneath valve 325, through pipe 330, passes open valve 323 and returns to the source of pressure by way of a pipe 331.

Upon desiring to lower the channel 217 the handle 320 (Fig. 54) would be shifted to the left whereupon both valves 324, 325 (Fig. 55) would be opened. Pressure fluid then flows from pipe 326 across valves 322, through a pipe 332, passes open valves 325 and through pipe 329 into the cylinder 316. In driving the ram 314 to the left the residual oil in the cylinder 317 is driven out into pipe 328 whence it flows past open valve 324, through a pipe 333 and beneath valve 323 of pipe 331 by which it is returned to the source.

The motions of the toggles 304, 305 (Figs. 1 and 54) are harmonized by a beam 334 which is connected at the mid-pivotal points. It will be understood from the foregoing description that in lowering the channel 217 the three toggles are bowed to the right, and that when these are again straightened to the position shown the channel 217 will be elevated. Thus in desiring to close and open the bottom end gates 8 and edges walls 127 the operator has only to shift the handle 320 respectively to the right and left when the desired actions will be accomplished.

The control valve mechanism 12 enables the operator to close and open the press from a safe distance. As brought out earlier in this description, the functions of the control valve mechanism are to fill both pairs of main and auxiliary cylinders 17, 18 and 19, 20 (Fig. 3) with fluid under an initial comparatively low pressure, then follow this with the application of fluid under a comparatively high pressure to the auxiliary cylinders 19, 20 while retaining the initial low pressure in the main cylinders 17, 18, finally applying said high pressure to all of the cylinders. It is also by means of this valve mechanism that pressure fluid is admitted to the reverse cylinders 2, 3 (Figs. 2 and 56) for the so-called opening of the press.

All of the foregoing changes of pressure and directions of the press are accomplished by the movement of the single control lever 335 (Fig. 51) of the main control valve generally designated 12. This control valve has eight double-ported, balanced, spring-loaded poppet valves 336, 337, 338, 339, 340, 341, 342 and 343, the valve members 344 of which are capable of being opened by the push of levers 345, 346, 347, 348, 349, 350, 351, and 352 by the action thereagainst of cams on a lay shaft 353 to which the foregoing control lever 335 is attached.

Figure 53 is in part a diagrammatic development of the control valve 12. Although the lay shaft 353 appears four times this is to be regarded as the same shaft. The cams 354, 355 are for the operation of the levers 345, 346 and are identical with cams 356, 357 for the operation of the levers 347, 348. These cams are spaced at 358, 359 so that a turn of the shaft 353 in one direction will not affect one pair of the levers for example 346, 348, while one pair of the cams for example 354, 356 raises the companion levers 345, 347.

In the instance of the valves 340, 341 the cams 360, 361 are spaced as at 362. The cam 360 comprises a blunt-pointed lobe while the cam 361 has a relatively long face. The co-acting lever 350 of the latter has a hook end which is best adapted to maintaining the valve member 344 of the respective poppet valve 341 open while the lever 335 assumes the neutral position as well as when said lever is moved to the left (Fig. 1) or closing position of the press.

The levers 351, 352 are also of the hook-end type, these being acted on by a single cam 363 in the nature of a blunt-ended lobe. This cam is adapted to hold the valve members 344 of both poppet valves 342, 343 open when the lever 335 assumes the neutral position (Fig. 53) and to close these valve members when the lever 335 is shifted either to the left or right respectively for the closing of the press or reversal and opening thereof.

In the neutral position of the valve lever 335 (Fig. 51) all of the main 17, 18, auxiliary, 19, 20 and reverse cylinders 2, 3 are opened to the pump tank 67 (Fig. 53) by virtue of the poppet valves 341, 342 and 343 being opened. The purpose of this provision is to relieve these cylinders of pressure. The conduits by which the main and auxiliary cylinders are interconnected at times and by which each of the various cylinders is connected with the poppet valves are described as follows:—A conduit 364 (Fig. 53) joins a branch 365 that in turn has common communication with ports 36 (Fig. 5) of the main cylinders 17, 18. This conduit has a lateral 367 which terminates at the poppet valve 340 which, in turn, has a connection 368 with the poppet valve 342. That valve has a pipe 369 discharging into the pump tank 67.

The continuation of the conduit 364 embraces a check valve 370 and terminates at the poppet valve 339, there being a branch 371 from this continuation that ultimately connects with a branch 372 commonly joining the ports 373 of the auxiliary cylinders 19, 20 (Fig. 56). The branch 371 contains a back check valve 374 and has a lateral 375 communicating by way of a branch 376 with the poppet valve 343 and by way of a branch 377 with the poppet valve 338.

The branch 371 also has connections 378 and 379 respectively with a low pressure cylinder 380 and a lateral 381 which terminates at balanced valves 382, 383 and has a connection at 384 with a high pressure cylinder 385.

Branches 386, 387 connect the valves 382, 383 respectively with the poppet valve 337 and the conduit 364. A conduit 388 connects the poppet valves 336, 341 and has a branch 389 leading to the previously described manifold 66 of the reverse cylinders 2, 3.

Fluid under a comparatively low pressure is supplied to the control valve mechanism by the accumulator 21 through a conduit 390 which communicates with the poppet valve 340. The previously described high pressure pump 22 has a connection at 391 with the poppet valve 336. Ports 392, 393 and 394 connect the respective pairs of the poppet valves 336, 337; 338, 339 and 342, 343. The general arrangement is shown both in Figures 52 and 53. A connection 395 joins the valves 341, 343 while a connection 396 joins valves 338, 340.

There are only three positions of the control lever 335 (Fig. 51) namely, neutral, closing and reverse or opening. These terms have reference to the action of the press. Assume the press boxes 7 to have been filled with stock and closed. The lever 335 will be moved to the left. The corresponding turning of the lay shaft 353 to the left will cause the opening of valves 337 and 339, leaving the valve 341 open and closing valves 342, 343. These actions are accomplished by the raising movements of the cams 355, 357 against the levers 346, 348, the long face of the cam 361 and the displacement of the cam 363 from beneath both levers 351, 352.

Fluid then flows under low pressure (approximately 50 lbs.) from the accumulator 21, through

conduit 390 to valve 340 (closed), thence by way of connection 396 to valve 338 (closed), through port 393 to valve 339 (open), past check valve 370 into conduit 364 to the branch or manifold 365 and from there into each of the main cylinders 17, 18. A division of the fluid flow occurs in the branch 371 past the check valve 374, reaching the connection or manifold 372 and from there flowing into the auxiliary cylinders 19, 20. Each of these cylinders is thus initially filled with fluid under an initially low pressure.

The valve members of the respective valves 382, 383 are connected with pistons 397, 398 in the cylinders 380, 385 where they are pressed against by springs 399, 400 respectively designed to yield at approximately 50 lbs. and 3800 lbs. per sq. in. on the opposite sides of the pistons. A portion of the fluid flowing to the auxiliary cylinders 19, 20 by way of the branch 371 is diverted to the cylinder 380 through the connection 378.

When the maximum low pressure is built up against the left side of the piston 397 so that the spring 399 is overcome there will be an opening of the valve 382 with a consequent admission of fluid under high pressure to the auxiliary cylinders 19, 20 by way of the connection 391, valve 336 (closed), port 392, valve 337 (open), branch 386, valve 382, lateral 381, connection 379, branch 371 to the connection or manifold 372.

Now there is the condition of high pressure fluid being supplied to the auxiliary cylinders 19, 20 while low pressure is still maintained in the main cylinders 17, 18. As the high pressure builds up against the left side of piston 398 the ultimate overcoming of the spring 400 will open the valve 383 so that there will be a division of the flow of the high pressure fluid into the branch 387 and conduit 364, whence it passes to the connection or manifold 365 to also fill the main cylinders 17, 18 with high pressure fluid. Thus all four cylinders are filled with high pressure fluid to impose maximum pressure on the stock in the press.

During the foregoing forward action of the press the residue of the reverse cylinders 2, 3 was discharged by the movement of the pistons 54 to the right (Fig. 56) with the ram block 5, the flow occurring through manifold 66 (Fig. 53), branch 389, conduit 388, valve 341, connection 395, around closed valve 343, through port 394 and through pipe 369 to the pump tank 67.

The foregoing pressure on the press is maintained as long as the control lever 335 remains in the left hand position. When it is shifted to the central or neutral position there will be an instant relaxation of the pressure in the main and auxiliary cylinders by virtue of the opening of the valves 341, 342 and 343 as shown in Figure 53 and as previously described. The next act is to reverse or open the press, and insofar as the retraction of the entering heads 10 from the press boxes 7 is concerned the function of the valve mechanism 12 is as follows:—

A shifting of the control lever 335 to the right will turn the lay shaft 353 to the right whereupon valves 336, 338 and 340 will open while valves 337, 339 will be permitted to remain closed, valves 341, 342 and 343 being moved to closed positions by the departure of cams 361 and 363 from beneath the ends of levers 350, 351 and 352.

The maximum 3800 lb. pressure of the pump 22 (Fig. 53) is now delivered to the right ends (Fig. 56) of the reverse cylinders 2, 3 by way of connection 391 (Fig. 53) open valve 336, conduit 388, branch 389 and manifold 66 which terminates at the ports 65. The result is a quick retraction of the entering heads 10 from the press boxes 7.

The opening pressure of the press is thus exerted against the right ends of the rams 4 both in the main and auxiliary cylinders 17, 18 and 19, 20. The fluid from the main cylinders is thus returned to the accumulator 21 by way of manifold 365, conduit 364, lateral 367, open valve 340 and conduit 390. Similarly, the fluid from the auxiliary cylinders 19, 20 is returned to the accumulator 21 by way of manifold 372, lateral 375, open valve 338, connection 396, valve 340 and conduit 390. The returning rams thus serve to charge the accumulator 21 in readiness for its next low pressure function.

The oil extraction system comprises the mode of handling cooked cotton seed meal or meats during a cycle of operations in which the meal carriage, press and cake stripper play the outstanding parts. The system is diagrammatically illustrated in Figures 60 to 64. These illustrations embrace parts of the meal carriage, press and cake stripper, details of the first and last of which are reserved for other applications.

The cans 14 are divided into compartments by gates 401 the horizontal series of which are opened by a successive operation of the previously mentioned connecting rods (not shown), starting at the bottom and working to the top. The meal carriage is thus the means for filling the press because the gates 401 are not opened as described until the meal carriage arrives at a position over the press boxes 7.

Dropping of the meal in sections fills the press boxes gradually. These thus become the molds for the cakes 25. The use of an independent mold is thus eliminated as is also the necessity of an operator carrying the formed cakes from an independent mold to the press. Intermediate manual handling of the stock is avoided.

The press cloths 123 (Figs. 60, etc.) hang down over the drainage heads 112 and 120 respectively of the entering heads 10 and press boxes 7 and in a manner form the sides of the compartments 128. These simple press cloths are adequate for all purposes. The remaining sides of the compartments 128 are completed by the bottom and top end gates 8 and 9 and the edge walls 127, thus avoiding the necessity of completely wrapping the stock prior to its introduction in the press as well as avoiding the bursting pressure on the press cloths as in the case of presses where end walls are not provided on all sides.

It so happens in the proportioning of the press and meal carriage that the horizontal series of stock sections drop progressively farther before striking the preceding stock in the compartments 128. This packs the stock, and the tendency is to pack the lower volumes harder than the upper volumes. This tendency is offset by the initial canting of the drainage heads 112 which straighten as the pressure is applied. The result is a mass of uniform density throughout the volume of each cake.

The provision for flushing the drainage heads 112 and 120 respectively of the entering heads 10 and press boxes 9 is an important part of the system. During the act of extraction the expressed oil flows from the press by gravity into a suitable reservoir, for example, as at 168^a (Fig. 74). A portion of this expressed oil is put under pressure by any appropriate means, for example the pump 168^b, and is used to flush out any solid substance tending to remain in the channels 122 thus guaranteeing clean channels.

It is significant that in practice the introduction of the flushing liquid will be delayed until the greatest surge or heaviest volume of extracted oil begins to flow from the compartments 128. At that period, which occurs when the act of extraction is approximately half completed, the low pressure bars 236 of the bottom end gates are dropped (Figs. 62 and 74) to provide an amply wide opening for the egress of the oil.

The time when the greatest surge of extracted oil occurs will also be marked by the greatest passage through of particles of solid matter. It is then expedient that the channels of the drainage heads 112 be flushed so that these particles will not remain to form obstacles. The expressed oil cannot be relied upon to carry these particles clear of the channels, hence use is made of the pump 168^b to forcibly return some of the oil from the reservoir 168^a and augment the flow through the drainage heads 112 and thus insure the clearance of the channels.

As a matter of practice, flushing by means of the pump 168^b would be stopped just prior to the end of the extracting act. As previously pointed out the retainer bars 173 are narrower than the drainage heads 120, hence leave openings of sufficient size for the drainage of the oil without the necessity of a provision for extracting it as in the instance of the respective low pressure bar 236.

After extraction has been completed and the press opened (Fig. 63) the cakes 25 will be found adhering to the press cloths 123. Instead of making it necessary for several operators to attend to the removal of the cakes, and incidentally take out all of the press cloths with the cakes as is now the prevailing practice, use is made of a stripper 402 which has components to enter all of the compartments 128 and simultaneously strip the cloths 123 from the cakes 25 and at the same time simultaneously grip all of the cakes to ultimately remove all of them simultaneously from the press leaving the press cloths 123 in the compartments 128 precisely where they were before in readiness for the next operation.

The gripping of the cakes for the extraction thereof from the compartments 128 is optional practice. As brought out in Case No. 3 the gripping means may be retreated to inoperative positions so that the sole function of the stripping means will be to release the cakes 25 from the press cloths 123, leaving the cakes free to drop out of the open bottoms of the press into whatever means may be provided for transporting them away. This procedure is possible because when the press is open the bottom end gates 8 are thrown back clear of the passage out of the compartments 128.

The operation has heretofore been described in considerable detail, therefore the following is but a brief resumé from beginning to end. Since the system is described under its own heading the following description will be devoted to the press only.

Rails comprising the channels 88 and cover plate 87 (Fig. 1) movably support the rollers 86 of the press box and entering head units 7, 10 at all times. These units are capable of movement away from and toward each other with an opening and closing or telescopic action which occurs between and fixedly mounted cylinder block 1 on one hand (Fig. 1) and head block 6 on the other hand.

Assume, first that all of the compartments 128 of the press have been filled as in the single instance in Figure 61. The filling of the compartments was accomplished by a progressive dropping of stock sections from the meal carriage typified in the cans 14 (Figs. 1 and 60), which occurred simultaneously over each of the compartments until they become filled to the top (Fig. 61).

The next act was to close the bottom gates 401 of the meal carriage (Fig. 61) and to move the meal carriage away. This clipped off the surplus stock leaving the latter flush with the tops of the compartments 128 (Fig. 62) and left the space above the press clear for the subsequent operations.

Prior to filling the compartments 128 it was necessary to close the bottom gates 8 as well as the edge walls 127 (Figs. 26 and 36). Unless these compartments are closed there would be nothing to prevent the stock from leaking out. This closing is accomplished by moving the handle 320 (Fig. 54) to the right. Pressure fluid is thus admitted to the cylinder 317 (Fig. 55) whereupon the channel 217 is raised with a consequent raising of all of the control guides 218, 219 (Figs. 4 and 26) by virtue of the action on the cranks 215 (Figs. 1 and 11).

The bottom gates 8 begin closing first. During the closing movement the edge walls 127 are picked up, so to speak, from which point both the bottom gates and edge walls continue to the ultimate closing movement together. Up to this time the top end gates 9 stood open. They assumed the erect position well illustrated in Figures 1 and 17. They were thus laid back out of the way of the meal carriage cans 14 upon approaching and departing from the press.

After filling all of the compartments 128 the next act is to close the top end gates 9. This is done by hand. The operator will grasp each pair of handles 271 (Fig. 1) and in bearing down on them will swing them on the arc of a circle until they end at the position shown in Figure 12. The links 275, 276 (Figs. 1 and 15) thus push the top end gate bars 196, 197 (Fig. 15) down (Fig. 16), and the key bars 189, 190 assume a locked position (Fig. 18) on top of said bars.

Next move the control lever 335 of the valve mechanism 12 to the left (Fig. 51). The following schedule of the valve positions will aid in the understanding of the fluid flow:—

Valve position	336	338	340	341	343	342	337	339
Forward	closed.	closed.	closed.	open.	closed.	closed.	open.	open.
Neutral	closed.	closed.	closed.	open.	open.	open.	closed.	closed.
Reverse	open.	open.	open.	closed.	closed.	closed.	closed.	closed.

Comparatively low pressure fluid is admitted to the main and auxiliary cylinders 17, 18 and 19, 20 (Figs. 3, 5 and 53) simultaneously. This fluid is supplied by the accumulator 21 and traverses the conduit 390, connection 396 and conduit 364 there being a division of the fluid into the branch 371. All of the rams 4 move forwardly or to the right with one accord. They act simultaneously on the ram block 5 and the action is to begin closing the entering heads 10 in all of the press boxes 7.

The stock will yield a little in each compartment 128 so that the initial compression will be made evident from one end to the other of the press. When the initial pressure has had its full effect then the fluid under comparatively high

pressure is admitted to the auxiliary cylinders 19, 20 and finally to the main cylinders 17, 18 also.

This is accomplished by a building up of maximum low pressure against the piston 397 (Fig. 53) which upon receding opens the valve 382 for an admission of high pressure fluid from the pump 22 to the branch 371. High pressure fluid is thus admitted to the auxiliary cylinders 19, 20. The low pressure fluid is maintained in the main cylinders 17, 18. When maximum high pressure is built up against the piston 398 (Fig. 53), the consequent opening of the valve 383 admits high pressure to the main cylinders 17, 18 also by way of the branch 387 and conduit 364.

Pressure is thus applied to the stock. Its application is gradual and progressive. The various pressure values are applied in stages. Thus there is a gradual extraction of the oil, and as this filters through the press cloths 123 (Figs. 36 and 42) the oil runs down the channels 122 of the drainage heads 112, 120 and out at the bottom of the press.

Up to the time that the leading bottom edge of the drainage head 112 (Fig. 60) (using only one for example) arrives at the line of demarcation between the high and low pressure bars 235, 236 the latter remains in its elevated position (Fig. 60) to necessarily complete the bottom end gate, or in other words to complete the bottom of the compartments 128. After said leading edge crosses the line then the bar 236 can serve no further as a bottom for the compartment, but has then imposed upon it the perhaps more important duty of providing an enlarged outlet for the flow of oil, which flow is a combination of both the immediately expressed oil and the flushing oil drawn from the reservoir 168[a] (Fig. 74) as previously pointed out. To this end the low pressure bar 236 is dropped or displaced (Fig. 62) by means of the pusher 240, this act occurring when the extraction of oil is approximately half completed.

Compression being completed the press is opened. This is accomplished by opening the top end gates 9 first, then separating the press box and entering head units 7, 10 and simultaneously opening the bottom end gates 8. The top end gates are opened by hand, and in doing this all of the pairs of handles 271 will be reversed, that is to say, moved on arcs of a circle from the lowered position (Fig. 11) to the raised position (Fig. 1).

The top end gates are thus opened, and the opening thereof makes room for the slight upward movement of the cakes 25 that will occur when the press box and entering head units 7, 10 are substantially separated. Since the press cloths are attached to these confronting units it follows that with the separation of the units there will be a slight peeling of the press cloths and a simultaneous raising action of the cakes so that the top edges of these will project slightly out of the respective compartments 128 (Fig. 62[a]).

Separation of the press box and entering head units is accomplished by moving the control lever 335 (Fig. 51) to the right. Fluid under high pressure is thus admitted to the right ends of the reverse cylinders 2, 3 (Figs. 3 and 56). This draws the ram block 5 back and all of the press boxes 7 and entering heads 10 with it to the limit of the coupling links 97 (Fig. 1). These units will thus stand in the relationship fragmentarily illustrated in Figure 39. The cakes 25 will stick to the press cloths 123 (Fig. 62[a]) but not to the faces of the drainage heads 112, 120.

The next act will be to shift the handle 320 (Fig. 54) to the left. By so doing the valve 13 will admit pressure fluid to the cylinder 316 (Fig. 55) and lower the channel 217 (Figs. 1, 4 and 54). All of the cranks 215 are thus rocked to the left (Fig. 12). The valves 12 and 13 will be operated so close together as to make separation of the press units and the lowering of the bottom end gates simultaneous.

In thus simultaneously lowering the control guides 218, 219 there will be an initial lowering of the bottom gates 8 during which the edge walls 217 will be picked up and moved away from the edges of each cake 25 simultaneously with the continued lowering of the bottom gates (Fig. 24). The cakes now hang free in the compartments 128, being suspended by the adhering press cloths 123. The next act, preceding the closing of the press, is a repetition of the foregoing operation wherein the stripper 402 is brought over the press first to free the cakes 25 from the press cloths 123 (Fig. 63) then to remove the cakes from the compartments 128 (Fig. 64).

It will be remembered that although the main purpose of the stripper is to strip the cakes 25 from the press cloths 123 and simultaneously grip the cakes for the extraction from the top of the press, it is equally possible to confine the function of the stripper merely to the stripping of the cakes from the press cloths and suspending their function of gripping the cakes for extraction from the press.

As brought out in Case No. 3, the gripping means may be retreated to an inoperative position. Upon introducing the stripper components the action would merely be to strip the cakes from the press cloths, leaving the latter hanging in the compartments 128 and the cakes free to drop out of the open bottoms. By virtue of the fact that the bottom end gates 8 are thrown back clear of the bottom passages, this procedure is perfectly permissible and is contemplated as an important feature of the system.

While the construction and arrangement of the improved press and system for handling liquid-bearing substances is that of a generally preferred form, obviously modifications and changes may be made without departing from the spirit of the invention or the scope of the claims.

I claim:

1. Apparatus for extracting liquid from liquid-bearing material comprising a material carriage movable toward and from a discharging position, a press in said position to receive material, means for closing and opening the press respectively to express the liquid, produce a cake and leave the cake accessible in the press, and means movable into position over the press to extract the cake.

2. Apparatus for extracting liquid from liquid-bearing material comprising a press having a plurality of cake-forming compartments, a material carriage movable toward and away from the press to fill the compartments and preliminarily form the cakes, means for contracting the press to express the liquid and complete the cakes, means to open the press to make the cakes accessible, and means to reach down into said compartments and extract all of the cakes simultaneously.

3. Apparatus for extracting liquid from liquid-bearing material comprising a press having a plurality of cake-forming compartments, a material carrier movable toward and from a discharging position over the press comprising an equal plurality of cans containing the material and discharging into all of the respective compart-

ments simultaneously to preliminarily form the cakes, means for contracting the press to express the liquid and to produce a plurality of cakes, means to expand the press thus widening the compartments to make the cakes accessible, and means to reach into all of the compartments simultaneously to grip and extract all of the cakes simultaneously.

4. Apparatus for extracting liquid from liquid-bearing material comprising a press having a plurality of cake-forming compartments, confronting press cloths facing certain sides of the compartments, means suspending said cloths at the top letting the remainder hang free, a material carriage movable toward and from a discharging position in respect to the press including an equal plurality of cans for simultaneously charging each of the compartments between the press cloths, means for contracting the press thus expressing the liquid and forming the cakes between the press cloths, means for expanding the press thus leaving the adhering cakes suspended from the suspending means of the press cloths, and means for reaching into each of the compartments for stripping the cakes from the press cloths beginning at said suspending means.

5. Apparatus for extracting liquid from liquid-bearing material comprising a press having confronting but spaced drainage heads, separate filtering means applied to the confronting faces of said heads, means for individually attaching said filtering means to said heads at corresponding ends, means to move the heads together thereby to express the liquid from liquid-bearing material between said heads through said filtering means, means to separate the heads thus leaving the cake suspended in the space by adhesion to said filtering means, and stripper means to pass between the cake and filtering means.

6. Apparatus for extracting liquid from liquid-bearing material comprising a press having confronting but spaced drainage heads, filtering means applied to the confronting faces of said heads, means for charging the spaced between said filtering means with material, means to move the heads together thereby to express the liquid through said filtering means, means to separate the heads thus leaving the cake suspended in the space by adhesion to said filtering means, and stripper means to pass between the cake sides and said filtering means to strip the latter from the cake and grip the cake for extraction from the space.

7. Apparatus for extracting liquid from liquid-bearing material comprising a press having confronting but spaced drainage heads, flexible filtering means attached along one edge of the respective heads and covering the confronting faces of the heads, means for moving the heads together to express the liquid from liquid-bearing material between the heads and form a cake, and means for separating the heads thus partially stripping the filtering means from the cake and slightly shifting the suspended cake in one direction in said space.

8. Apparatus for extracting liquid from liquid-bearing material comprising a press having confronting but spaced drainage heads, flexible filtering means attached along one edge of the respective heads and covering the confronting faces of the heads, means for filling the spaces between the filtering means with material, means for moving the heads together to express the liquid and form a cake, means for separating the heads thus partially stripping the filtering means from the cake and slightly shifting the suspended cake in one direction in said space, and stripper means for initially pressing on the partially stripped filtering means then passing along between the cake sides and filtering means to strip the cake from the latter, leaving the filtering means in position over the faces of the drainage heads.

9. Apparatus for extracting liquid from liquid-bearing material comprising a material carriage movable toward and from a discharging position, compressing means in said position capable of being opened and closed in approximate agreement with the movement of the carriage thereby to receive the material during the period of discharge and compress it for the extraction of the liquid and the formation of the cake during the return movement of the carriage, and reciprocable extracting means operating in alternation with the carriage being extensible into said compressing means to assume the extracting position while said compressing means is open thus to extract the cake.

10. Apparatus for extracting liquid from liquid-bearing material comprising a press capable of closure and opening, and separate means operating in alternation with each other in the assumption of a working position in respect to the press, respectively to charge the press with material while open prior to its closure and to enter the press to take hold of and extract the cake after reopening of the press.

11. In a press, press box and entering head units, each with confronting drainage heads of which one is longer than the other, edge-closure means disposed around the edges of the units to define a material compartment, and filtering means applied to the confronting faces of the drainage heads, said filtering means being of lengths approximately equal to the respective drainage heads thus enabling one component of the edge-closure means to clear the short filtering means and bear against the long filtering means when the press is closed.

12. In a press, press box and entering head units, each with confronting drainage heads of which the former is longer than the latter, edge-closure means including an end gate coacting with the units to define a material compartment, filtering means applied to the faces of the drainage heads respectively extending past the end gate in the instance of the press box unit and stopping short thereof in the instance of the entering head unit, and means forming part of the end gate contacting a part of the press box unit and limiting the pressure of the end gate against the respective filtering means when the press is closed.

13. A pair of abutments spaced from each other, one of the abutments being movable into either of at least two positions, at least one column to span the distance between the abutments, heads on the column stationed behind parts of the abutments, and at least one filler insertible between one of the heads and the part of the respective abutment on either side of the head in the long direction of the column depending on the position of the movable abutment.

14. A press comprising a series of telescopic press box and entering head units capable of additon and subtraction for a varied original setup, an abutment for each end of the series, columns carrying the series of units spanning the abutments and having end support thereon, means embodied both in one of the abutments and the respective ends of the columns to make a long or

short adjustment of the columns in said original setup, and pressure means independent of the columns to close and open said units with equal facility in either adjustment of said columns.

15. A press comprising a series of telescopic press box and entering head units capable of addition and subtraction, for long and short adjustments of the series, an abutment for each end of the series, each having anchorage recesses, columns providing tie means between the abutments being anchored at the ends in the recesses of each abutment for a long adjustment of the series, and means used in conjunction with one of the abutments for spacing one end of the columns from the respective anchorage recesses for a short adjustment of the series.

16. In a press, press columns on which a pull is exercisable, said columns having heads at one end, a block having recesses for a flush reception of the columns providing shoulders against which the heads are rested in a long "hitch" adjustment of the press, filler means insertable between the heads and shoulders for a short "hitch" adjustment of the press, ribs on the block distributing the pull of the press columns, and fins set back from the ribs to be flush with the recesses and afford rests for the columns and filler means in said short "hitch" adjustment.

17. In a press, a block having a recess providing shoulders, a press column insertable flush in the recess and having a head either contactable with or spaced from the shoulders respectively for long and short "hitches" of the press, ribs partially defining a chamber for the occupancy of the head, filler means in the chamber either contacting one side of the head or being situated between the other side of the head and said shoulders, a member connected to the ribs across the shoulder, and means for securing the filler means to said member in either of its positions with respect to the head.

18. In a press, a ram block having an ear with a socket and a hole, means for moving the ram block in one direction including a rod having a ball seated in the socket, a roller for the support of the block during movement, and a fork carrying the roller having a shank fitting in the hole.

19. In a press, a series of press box and entering head units having cake compartments, means to increasingly press on the series to close the units for an expression of liquid from cakes in the compartments, and means for equalizing said pressure including tracks along which the series is movable, and unit-supporting rollers having the axes located in a horizontal plane bisecting the transverse pressure area of the cakes.

20. In a press, tracks, rollers running on the tracks, a series of press box and entering head units by which the rollers are carried being of such structure that a preponderance of the weight extends below the rollers, and means outlining pressure areas between said units, being bisected by the axial plane of the rollers enabling a free rocking motion of the units and a running up thereof in true perpendicular positions when the series is under pressure.

21. In a press, a series of press box and entering head units, each of the latter having pads on opposite faces, a movable ram block at one end of the series having a pad confronting the first press box, drainage heads on all of the pads of the entering units with the exception of the outer pad of the last entering unit in the series, means by which the absent drainage head of that unit is mounted on the pad of the ram block to convert the ram block into an entering head for said first press box, and a fixed head block at the other end of the series having a pad with which the outer pad of the last entering head is contactable.

22. In a press, a unit comprising a part of means for applying pressure to liquid-bearing material, a drainage head for the unit, a hinge by which the head is attached to the unit, and a pad on the unit defining a recess for the hinge and providing a continuous backing for the drainage head when under pressure.

23. In a press, an entering head, an outstanding pad on the head having a formation of hinge knuckles across one edge, and a drainage head to rest against the pad having a corresponding formation of hinge knuckles connectible with those across said edge.

24. In a press, an entering head, an outstanding pad on the head having a formation of hinge knuckles across one edge, a drainage head to rest against the pad having a corresponding formation of hinge knuckles connectible with those across said edge, and means for swinging the drainage head on the hinge formation causing it to assume a canted position in reference to said head.

25. In a press, an entering head unit, a drainage head, means for movably connecting said head along one edge to said unit, and resilient means tending to move said head in reference to the unit to assume a canted position.

26. In a press, a drainage head having channels, pipe connections joined with the head for flushing the channels and heating the head, an entering unit, a hinge by which the drainage head is connected with the unit, and a pad on the unit providing a backing for the head but being smaller than the back side of the drainage head for accommodating the hinge and said pipe connections.

27. In a press, press box and entering head units, tracks along which the units are movable, a fixed head block with which the tracks are connected and acting as an abutment for the units, brackets carried by the units having rollers riding on the tracks, and means on the head block contactable with and spacing the nearest entering head from the head block to prevent the brackets of that entering head engaging the head block.

28. A press comprising a pair of entering head units, drainage heads mounted on the confronting faces of said units and constituting plungers, an intermediate press box casting, and means on opposite sides of the casting defining compression chambers to be entered by said plungers and including drainage heads mounted on the casting to confront said plungers.

29. A press comprising a plurality of press boxes each having compression compartments on opposite sides rendering said boxes double, and entering heads arranged in alternation with said boxes, each having plunger means on opposite sides rendering them double to coact with the respective compartments.

30. In a press, a press box comprising compartment forming means including movable front and rear edge walls, and ribs providing bearings against which the edge walls are slidable.

31. In a press, a press box casting having a web with a slot and a recess producing a rib, a drainage head seated in the slot, and an

edge wall movable across the rib from a position adjacent to the drainage head to a position over the recess.

32. In a press, a press box having a drainage head, an edge wall movable to a boundary line position of the drainage head, and a rib beside the drainage head across which the edge wall has movement, said rib and edge wall having grooves to match when the boundary position is reached to provide a channel for drainage.

33. In a press, a press box having a drainage head, an edge wall movable to a compressing position at an edge of the drainage head, and a rib across which said wall is movable, retaining the drainage head and having a groove confronting the edge wall for draining seepage escaping past said wall.

34. In a press, a press box having an edge wall partly defining a cake compartment, linkage for moving the edge wall toward and from an adjacent cake line of the compartment, and means coacting with the edge wall to define a chamber by which the linkage is contained.

35. In a press, a press box having means defining a linkage chamber, an edge wall completing said chamber and defining part of a cake compartment, a linkage in the chamber being connected with the edge wall to move it out and in respecting the chamber, hence in and out respecting the compartment.

36. In a press, a press box having a slot and a recess defining a rib, said rib having a groove, a drainage head seated in the slot flush with the rib, an edge wall defining part of a cage compartment being movable toward the drainage head or toward the recess, and means in the recess spaced from the rib to afford a passageway for the dropping out of substance carried from the compartment by said groove and to provide a guide for the edge wall in its movement over the recess.

37. In a press, a press box having an edge wall defining part of a cake compartment, release means by which said wall is moved laterally in outward and inward directions respecting the cake line, connecting linkage tending to pull the wall and release means together upon the outward movement of the edge wall, and guide means receiving the inward thrust of the release means thus confining the lateral movement to the edge wall.

38. In a press, a press box having a linkage chamber which includes a web and a cover plate, an edge wall movable between the web and cover plate, defining part of a cake compartment, means for moving said wall outwardly and inwardly respecting the cake line said means including release means operable between the web and cover plate, guide means mounted on the web resisting the inward movement of the release means when causing the outward movement of the wall, and guide pins seated in the cover plate having heads contacted by said release means to assist said guide means.

39. In a press, a press box having an edge wall defining part of a cake compartment, release means movable in either of two directions, linkage connecting the release means with the edge wall, and means guiding the linkage to convert the movements of said release means into movements in different directions toward and from the cake line.

40. In a press, a press box having an edge wall forming part of a cake compartment, vertically movable release means, linkage for transmiting the movements of the release means to the edge wall, and means for guiding the linkage to convert said vertical movements of the release means into horizontal movements of the edge wall.

41. In a press, a press box having an edge wall defining part of a cake compartment, vertically movable release means, links pivotally connected to the release means and edge wall, rollers combined in the pivots, and guide blocks over the adjacent vertical and horizontal edges of which the respective rollers of the guide means and edge wall are movable to constrain the edge wall to horizontal movements while the release means makes its vertical movements.

42. In a press, a press box having an edge wall defining part of a cake compartment, a link comprising part of actuating means for said wall said link including a journal, and a boss on the wall having a concavity to receive the back of the link, and a hinge knuckle with a hole matching the concavity to receive the journal.

43. In a press, an edge wall forming part of a cake compartment, linkage forming part of wall-actuating means, each link having a journal merging into a rounded back, and bosses on the edge wall having concavities to receive each journal and rounded back, the tops of the bosses being slanting to cause oil accumulating thereon to be shed toward the respective concavity.

44. In a press, a press box having an edge wall defining part of a cake compartment, release means for actuating said wall, links connected between said means and the wall each having a pair of trunnions and a pair of pins at opposite ends, complementary links fitted across the pins, rollers journaled on the trunnions, and means defining a chamber in which said linkage is closely fitted avoiding the necessity of separate retainers for the complementary links and rollers.

45. In a press, a drainage head having channels, an abutment for the drainage head, said abutment and drainage head having matching grooves defining a manifold extending across the channels, and a press box web upon which the abutment and drainage head are mounted, having a duct and a leader communicating with the manifold.

46. In a press, a drainage head having channels, a press box web upon which the head is mounted to define part of a cake compartment, means to conduct oil to the channels including a bore in the web, a bar providing a top end gate for the compartment, and a pin by which said bar is hinged to the web having an oil passage communicating with the bore.

47. In a press, a press box web having a drainage head, a press cloth across the face of said head and having a hem, and means from which the press cloth is suspended comprising an abutment for the drainage head affixed to the web and a clamp engaging the abutment also being affixed to the web, said abutment and clamp having confronting rabbets defining a pocket to receive the hem of the press cloth.

48. In a press, a press box web provided with a plurality of slots, means defining a cake compartment including a top end gate bar, reinforcing ribs across the bar to enable said bar to withstand pressure from said compartment, and hinge means by which the bar is attached to the web for swinging to an open position, said ribs then being pocketed in the slots.

49. In a press, a press box web having a series of slots the end one of which are of single widths and the intermediate ones of double widths,

means carried by the web defining cake compartments on opposite sides including top end gate bars, hinges by which they are mounted on opposite sides of the web, and reinforcing ribs on the bars the diagonally opposite ones of which are adapted to be pocketed in said single slots, the remaining ones of which are sufficiently offset to enable pocketing of pairs in the remaining double slots when said bars are swung open.

50. In a press, a press box comprising side edge walls and a bottom end gate partially defining a cake compartment, and means to shift said walls and gate in diverse directions.

51. In a press, a press box comprising side edge walls and a bottom end gate partially defining a cake compartment, and means to successively move said gate and walls in diverse directions.

52. In a press, a press box comprising side edge walls and a bottom end gate partially defining a cake compartment, and means operable in either of two directions to first cause a movement of said gate then of said walls either toward or away from each other.

53. In a press, a press box comprising side edge walls and a bottom end gate, means which is shiftable in either direction with but a single operating movement in the respective direction, means connecting said gate directly with said shiftable means to cause an immediately responsive movement of said gate, and means indirectly connecting the edge walls with said shiftable means to cause a delayed responsive movement.

54. In a press, a press box comprising a pair of side edge walls and a bottom end gate, means adjoining the ends of the gate and the respective edge walls being shiftable in either of two directions, means directly connecting the substantial ends of the gate with the respective shifting means for an immediately responsive movement, and means providing a loose connection between said edge walls and the respective shifting means for causing a delayed responsive movement.

55. In a press, a press box comprising side edge walls and a bottom end gate, release means for the edge walls, shiftable means, means for directly connecting the end gate with the shiftable means for causing an immediate response of the end gate upon movement of the shiftable means, means indirectly connecting the release means with said shiftable means for causing a delayed response, means connecting the release means with the edge walls for imparting the delayed movement, and means guiding the latter means and said edge walls in directions at angles to the direction of the release means.

56. In a press, a press box comprising side edge walls and a bottom end gate, release means for the edge walls having connecting means for moving the edge walls upon a shifting of the release means, each of said release means having a slot, shiftable means having studs occupying the slots and causing a delayed motion of the release means upon a shifting of the shiftable means, the latter having arcuate slots, and connections between the shiftable means and the bottom end gate including means riding in the arcuate slots causing an immediate response of said gate upon a shifting of the shiftable means.

57. In a press, a press box including a pair of bottom end gates, rockable means pivotally connected with said end gates for up and down movements, a block incorporated in each pivotal connection, and shiftable means having slots receiving the blocks, said slots being so arranged as to force the blocks in opposite directions upon a shifting of said means thus to raise and lower the gates.

58. In a press, a press box including means partially defining a cake compartment, said means comprising independently operable top and bottom end gates, and side edge walls operable in conjunction with one of the end gates.

59. In a press, a press box including means partially defining a cake compartment, said means comprising independently operable top and bottom end gates, and side edge walls operable in conjunction with the bottom end gate.

60. In a press, a press box including means partially defining a cake compartment, said means comprising a bottom end gate, side edge walls, means joining the bottom end gate and side edge walls for a successive opening and closing action, and a top end gate operative independently of either the bottom end gate or side edge walls.

61. In a press, a press box including means partially defining a cake compartment, said means comprising a bottom end gate, a rockable mounting to swing said gate in opposite directions, side edge walls, means to slidably support the edge walls for movements in opposite directions, actuating means connecting said gate and edge walls for producing the respective movements, and a hinged top end gate independently swingable on opening and closing movements.

62. In a press, a press box including means partially defining a cake compartment, said means comprising a drainage head, a bottom end gate and side edge walls, a pair of control guides, means for moving the bottom end gate down and away from or up and toward the drainage head being connected with said control guides, means for moving the edge walls laterally away from and toward the drainage head also being connected with said control guides, and means for reciprocating the control guides in opposite directions for producing said movements.

63. In a press, a press box web, a bottom end gate movable in reference to the web, means by which said gate is rockably supported, a block on which the rockable means has bearing, and a bracket built out from the web for supporting the bearing block.

64. In a press, a press box web, a bottom end gate movable in reference to the web, means by which said gate is rockably supported, a block on which the rockable means has bearing, a bracket built out from the web for supporting the bearing block, means for adjusting the block in reference to the web, and means for securing the block to the bracket and maintaining the adjustments.

65. In a press, a press box including means partially defining a cake compartment, said means comprising a bottom end gate, control guides, means for moving the gate on being connected with the control guides, means for reciprocating the control guides simultaneously comprising a shaft having cranks, and a connection between the cranks and control guides.

66. In a press, a press box including means partially defining a cake compartment, said means comprising a bottom end gate, a pair of control guides, means for moving said gate being connected with the guides, a shaft having three cranks, connections between two of the cranks and the respective control guides, and mechanism for operating on the third crank to turn the

shaft and thus shift the guides for the movement of the gate.

67. In a press, means partially defining a cake compartment, said means comprising a bottom end gate and an edge wall, rockable supporting means for the gate, slidable supporting means for the wall, a release bar for actuating the slidable supporting means, said bar having an extension, and a control guide for actuating the rockable supporting means, said guide having a groove receiving the extension for the guidance of the control guide.

68. In a press, a reciprocable release bar having an extension with a slot, and a control guide for actuating said bar with a delayed motion, having a stud occupying the slot and having a groove receiving the extension for the guidance of the control guide in its movements.

69. In a press, means partially defining a cake compartment, said means comprising a bottom end gate, rockable means for supporting said gate having a pivotal connection with the gate, a segmental block mounted on an extension of the pivot, and a reciprocable control guide having a slot to receive the block and cause rocking motion of the rockable means upon reciprocation thus to shift the bottom end gate.

70. A press comprising a press box and an entering unit, confronting drainage heads respectively on the press box and unit, means completing a cake compartment between the heads, said means including a bottom end gate which is composed of a plurality of members, and means for displacing one of the members upon passage of the entering drainage head beyond said member thus to make room for expressed liquid.

71. A press comprising a press box and an entering unit, confronting drainage heads respectively on the press box and unit, each drainage head having a plurality of channels, means partially defining a cake compartment between the drainage heads, said means comprising a bottom end gate disposed against the face of the press box drainage head and being composed of a plurality of members, and means for shifting one of the members away from the entering unit upon movement of its drainage head past said member thus leaving its channels unobstructed for the drainage of liquid.

72. A press comprising press box and entering units in spaced confronting relationship, said units having open drainage outlets, edge-closure means disposed around the edges of the units to define a cake compartment, said means including a sectional bottom end gate, means for applying pressure in increasing stages to move one unit in reference to the other for the expression of liquid from material contained by the compartment, means for causing the collapse of one of the sections during the application of pressure to provide an additional outlet for the liquid, and means for maintaining the other section in position to withstand the maximum pressure.

73. A press comprising press box and entering units, said units having open drainage outlets, edge-closure means disposed around the edges of the units to define a cake compartment, said means including a sectional bottom end gate, means for exerting pressure on the units to move one in reference to the other for the expression of liquid from material in the compartment, means maintaining one of the sections in position for the duration of the pressure, means collapsibly supporting the other section, and means on one of the units for engaging said means during the movement of said unit thus to displace the other section and provide an additional liquid outlet.

74. A press comprising press box and entering units, said units having open drainage outlets, edge-closure means disposed around the edges of the units to define a cake compartment, said means including a sectional bottom end gate, means for exerting pressure on the units to move one in reference to the other for the expression of liquid from a material in the compartment, means to fixedly support one of the sections for the duration of the pressure, a toggle supporting the other section, and means actuated by one of the units during said movement to trip the toggle for the displacement of the respective section and the provision of an additional liquid outlet.

75. A press comprising press box and entering units, edge-closure means disposed around the edges of the units to define a compartment in which a cake is compressible, said means including a bottom end gate, means to impart an opening movement to one of the units thus to separate the cake, and means to displace the bottom end gate to a position of contact with said unit so that it will follow said unit during said opening movement.

76. In a press, a press box, means partially defining a cake compartment for the box, said means including a sectional bottom end gate, means rockably supporting the bottom end gate for movement between compressing and released positions, and means for shifting the sections relatively to each other during said movements.

77. In a press, a press box having a web, a drainage head mounted thereon, a press cloth on the face of the drainage head, and a bottom end gate forming part of edge-closure means, said gate including a bar having offset heads to engage the web and define a recess by which the drainage head and press cloth are received.

78. In a press, a press cloth having a web, a drainage head mounted on the web, a press cloth applied to the face of the head, a bottom end gate including a bar having heads defining a recess, and means to shift the bottom end gate toward and away from the web in closed and open positions of the press, said heads engaging the web to limit the pressure against the press cloth when the drainage head and press cloth are received by the recess in said closed position.

79. In a press, a bottom end gate movable to closed and open press positions and comprising high and low pressure bars, rockable means for supporting the high pressure bar, a toggle for independently supporting the low pressure bar, means for breaking the toggle upon assumption by the gate of said closed position thus to offset the low pressure bar from the high pressure bar, and means carried by one of the rockable means acting to erect the toggle during movement of the gate to the open position and thus supply the low pressure bar in reference to the high pressure bar.

80. In a press, a bottom end gate comprising high and low pressure bars, rockable means on which said gate is swung from a closed to an open press position, a toggle independently supporting the low pressure bar being angled during the assumption of the closed position, means for straightening the toggle during swinging to the open position, and means incorporated in the toggle for limiting the straightening action.

81. In a press, a rocking post having pivotal hubs at its extremities, a bearing block for the support of the post, a bottom gate bar supported by the post, and a head on the bar, said head and block having concavities by which the hubs are received for bearing.

82. In a press, a press box web, a drainage head mounted on the web, a bottom end gate defining part of edge-closure means, rockers for supporting said gate, and means for causing said rockers to assume leaning positions toward the web when the gate is closed thus tending to force the gate toward the web when under pressure.

83. In a press, a press box web having a drainage head on each side, bottom end gates forming parts of double-compartment edge-closure means, and means for simultaneously spreading and lowering said gates in reference to the drainage heads and vice versa.

84. In a press, a press box and entering units having a cake compartment therebetween, confronting drainage means embodied in said units, and individual press cloths attached to the units to loosely hang down over the drainage means.

85. A press, press box and entering head units, edge-closure means coacting therewith to define a cake compartment, said means including a top end gate, and means movable in position against the gate when closed to resist internal pressure.

86. In a press, press box and entering head units, said press box including a superstructure, edge-closure means coacting with said units to complete a cake compartment, said means including a top end gate, means by which said gate is mounted on the superstructure for movement to a closed position, and means also mounted on the superstructure movable against the top end gate to key it in the closed position.

87. In a press, means defining a cake compartment including a movable top end gate, movable means for keying said gate in a closed position, a handle for moving the gate, and a link connecting the gate with said means so that the handle movement can be imparted to both said means and the gate.

88. In a press, a press box having a superstructure, means partially defining a cake compartment including a top end gate, means by which said gate is movably mounted on the superstructure, and a spring connected between the gate and superstructure assisting in the opening movement and cushioning the closing movement.

89. In a press, a press box web having a superstructure, means on opposite sides of the web defining cake compartments, each means including a top end gate, means for movably mounting said gates on the superstructure, key levers for holding the gates in closed positions, hinge pins for separately pivoting said levers to the superstructure, said pins being extended at diagonally opposite ends, and springs attached respectively to the top end gates and to the extended pin ends, being situated at opposite ends of the key levers and bearing a crossed relationship.

90. In a press, means defining part of a cake compartment including a top end gate, reinforcing ribs on the gate, a key lever to hold the gate in a closed position, and feet on the key lever matching and engaging said ribs.

91. A press comprising means composing a cake compartment, means upon which one of the walls of the compartment is movable, and resilient means moving said wall to a canted position during the filling of the compartment with stock and relaxing under the application of pressure to said compartment means until the cant disappears.

92. A press comprising enclosure means composing a cake compartment fillable with cake stock, drainage heads on confronting sides of said enclosure means, means to press on part of said enclosure means to reduce the compartment and compress the cake, and means so mounting one of the heads as to cause canting of the head in reference to the enclosure means during filling of the compartment and subsequent straightening of the head upon the application of pressure.

93. In a press, a press box unit, a drainage head hingedly mounted thereon, and resilient means for swinging said head on its hinge to assume a canted position.

94. A press comprising spaced press box and entering units, means to insure the upright posture of said units during closing and opening movements, confronting drainage heads on the respective units, one being fixed the other movable, means to provide edge and bottom closures for the filling of the space with stock while the units are open, and means for then shifting the movable drainage head in reference to its unit to assume a slanting position in reference to the other drainage head making the space narrower at one end that the other during said filling.

95. A press comprising press box and entering units having a compartment spaced therebetween, a movable drainage head on one of the units forming a wall of the compartment, means tending to move said head to a canted position, a bottom end gate forming part of edge-closure means for the compartment, means to separate the units subsequently to a cake compression, means to retract the edge-closure means during said separation causing the bottom end gate to fall back against one of the units and follow it during the separating movement, and means then engaged by said end gate to keep the drainage head from assuming the canted position.

96. A press comprising press box and entering units with a compartment spaced therebetween, a drainage head movably mounted on one of the units forming a wall of the compartment, means tending to move said head to a canted position, edge-closure means capable of movement to open and closed positions in reference to the compartment, said means including a bottom end gate, and means engageable by the bottom end gate when open to restrain the canting of the drainage head but being released by said gate when initially closed to enable the canting of the drainage head.

97. A press comprising a series of press box and entering head units in telescopic relationship, edge-closure means coacting with said units to define compartments, means for moving the units together or apart to establish closed and opened positions of the press, and means for moving said edge-closure means regardless of the positions of the units in the series to either contract or extend said means to agree with the closed and open positions of the press.

98. In a press, a plurality of edge-closure means each including a shaft, and means for simultaneously moving all of the shafts in either of two directions respectively to shift said closure means to contracted or extended positions.

99. In a press, a plurality of edge-closure means each including a shaft, a crank on each shaft, anti-friction bearing means on each crank, and means loosely receiving all of the anti-friction

bearing means, being operable thereupon to simultaneously turn all of the shafts in either of two directions thus to simultaneously either shift the edge-closure means to contracted or extended positions.

100. A press comprising a series of press box and entering units in telescopic relationship, means for moving the units either together or apart to establish closed or open positions of the press, edge-closure means situated between the units, each of said means including a crank with a roller, a member in which the rollers are confined and along which they will run during the closing and opening movements of the press, and means for shifting said member in either of two directions thus to simultaneously either shift said edge-closure means to contracted or extended positions to agree with the closed and open positions of the press.

101. In a press, bodily movable edge-closure means comprising relatively shiftable sections, a crank and roller to which actuating force is applied for the relative shifting of the sections at the approximate extremities of said bodily movement, a member along which the roller will run upon the assumption of said extremities, pressure means including a ram for shifting said member to produce the relative shifting of the sections, and connections between the ram and said member.

102. Apparatus for extracting liquid from liquid-bearing material comprising a press having spaced, confronting drainage heads with drainage channels, means to move the heads together thus to extract the liquid from a charge of material in the space, a reservoir in which the liquid is collected, and means for returning a portion of the liquid to the drainage heads for flushing the channels.

103. Apparatus for extracting liquid from liquid-bearing material comprising confronting drainage heads, edge-closure means coacting with said heads to define compartments, means for moving the heads together for the extraction of liquid from material in the compartment, a reservoir to catch the extracted liquid, means for reconducting a portion of the liquid under pressure to the drainage heads for flushing them during extraction, and means for displacing a part of the edge-closure means to provide an outlet for the combined liquids.

104. Apparatus for extracting liquid from liquid-bearing material comprising a press having movable units, a reservoir to receive the liquid extracted by the press, means for conducting a portion of the liquid from said reservoir to the press for flushing after a period of idleness of the press, and means to heat the liquid before discharge into the press thereby to heat the press units.

105. A press comprising units movable together to perform an extracting operation, edge-closure means to define a material compartment, a drainage head on one of the units to enter the compartment to extract the liquid for flowing into the drainage head, and means for moving a portion of one of the edge-closure means to provide an outlet for the fluid.

106. A press comprising units movable together to perform an extracting operation, edge-closure means including a bottom end gate having a section movable for the escape of liquid, and a drainage head mounted on one of the units having liquid channels with communicating cut-away portions to provide a liquid egress irrespective of said section.

107. In a press, a pair of heads of which one is movable relatively to the other into a confronting position to define two of the walls of a cake compartment, a bottom end gate for the compartment, said gate including a plurality of members, and means for displacing one of the members when the movable head has passed beyond said one member in the direction toward the other member.

108. In a press, a bottom end gate including a high and low pressure bar located side by side in slidable contact, movable supporting means for the bars, and means for moving the supporting means to shift the bars into either of two positions and at the same time cause relative sliding between the bars.

109. In a press, a bottom end gate including a high and low pressure bar located side by side in slidable contact, movable supporting means for the bars, means for moving the supporting means to shift the bars into either of two positions and at the same time cause relative sliding between the bars, and means for actuating a part of the supporting means when the bars are in one position thereby to drop the low pressure bar with respect to the high pressure bar.

110. In a press, a press box unit assuming an open position, a drainage head hingedly mounted thereon, a press cloth and means by which said cloth is attached to the substantial top of the head to extend downward, said cloth being traversable by a stripping tool to free the cloth from a cake during said open position of the unit, a bottom end gate also assuming an open position, and means actuated by the bottom end gate to hold the drainage head hard against the press box unit to prevent hinge movement during stripping.

111. In a press, a press box unit, drainage head hingedly mounted thereon, means tending to swing head on its hinge to assume a canted position, a bottom end gate movable in the direction of said press box unit, and means carried by the drainage head in position to be pressed against by said bottom end gate holding said head hard against the press box unit and preventing the canting of the head.

112. In a press, a press box unit, a drainage head hingedly mounted thereon, means tending to swing said head on its hinge to assume a canted position with respect to said unit, means pivotally connecting the free end of the head with said unit, said means being thus pivotally mounted and working in consonance with the head, and a bottom end gate movable with respect to the press box unit, said gate being engageable with said pivotally mounted means to drive the drainage head against said unit and prevent its assuming a canted position.

113. In a press, a press box unit, a drainage head and means by which one end is movably mounted on said unit leaving the other end loose and free for movement, means tending to move the free end so as to cant the drainage head with respect to said unit, and means for driving the head hard against said unit to prevent said movement.

114. In a press, a press box unit, a drainage head hingedly mounted thereon, resilient means tending a swing said head on its hinge to assume a canted position, a bottom end gate which is movable toward and away from said unit, means

bridging the head and unit being engageable by said gate when moving toward the unit to drive the head hard against the unit, and power means by which the bottom end gate is moved toward the unit so as to overcome the resilient means in holding the head against the unit.

115. In a press, a press box unit, a drainage head hingedly mounted thereon, resilient means tending to swing said head on its hinge to assume a canted position, a bottom end gate which is movable toward and away from said unit, means bridging the head and unit being engageable by said gate when moving toward the unit to drive the head hard against the unit, and a hydraulic release motor having means for expending power against the bottom end gate, driving said gate against the bridging means to overcome the resilient means and hold the drainage head against said unit.

116. In a press, a drainage head adapted to define a wall of a cake compartment, a press box unit and means by which said head is loosely mounted on the unit, said unit being movable to dispose the head in open and closed cake compartment positions, a press cloth and means by which its top is attached to the substantial top of the head so as to hang down, said cloth being traversable by a stripping tool to release a cake when the head is in its open position, and means for then holding said head erect with respect to the unit, preventing its loose movement and preventing injury to the cloth by the stripping tool.

117. In a press, cake compartment structure including side and bottom edge closure means as well as press box and entering head units, said units having drainage heads defining compartment sides, hinge means for movably mounting one of the drainage heads on said entering head unit, means acting on the respective drainage head to maintain it in an initially canted position, and pressure means to close said units against a compressible substance in said compartment, said canted drainage head straining against its entering head unit under the ultimate pressure of said pressure means.

118. In a press, cake compartment structure including press box and entering head units movable toward and separate from each other to assume closed and open cake compartment positions, a drainage head and means by which it is hingedly mounted on the entering head unit, presser means tending to cant said head during the separating movement of the entering head unit, a bottom end gate also included in said cake compartment structure, and means for moving the bottom end gate into each of two operative positions, respectively to close the bottom of the compartment when said units are moved toward each other, and to overcome said presser means and cause the drainage head to lie hard against its respective unit when the press box and entering head units are separated.

119. In a press, a press box having an edge wall defining part of a cake compartment, a press cloth hanging in said compartment, said cloth being traversable by a stripping tool to free the cloth from an adhering cake, a release bar and means connecting the bar with the wall for moving the wall to an open position for the entrance of said stripping tool, and power means by which said release bar is operated, said power means holding the edge wall open to prevent injury to the stripping tool and press cloth.

120. In a press, a press box having a top end gate defining part of a cake compartment, a press cloth in the compartment, means for moving the top end gate to an open position, and power means for holding said gate in the open position.

121. In a press, a press box having a top end gate, key means to hold the gate in its closed position whereat it defines part of a cake compartment, a press cloth in said compartment, means to move the top end gate and its key means to open and erect positions to enable access of a stripping tool to the compartment for the release of a cake from the cloth, and power means for holding the top end gate and its key means in said positions during the stripping operation.

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