Aug. 11, 1942. C. STEVENS 2,292,487

MACHINE FOR WRAPPING PAPER

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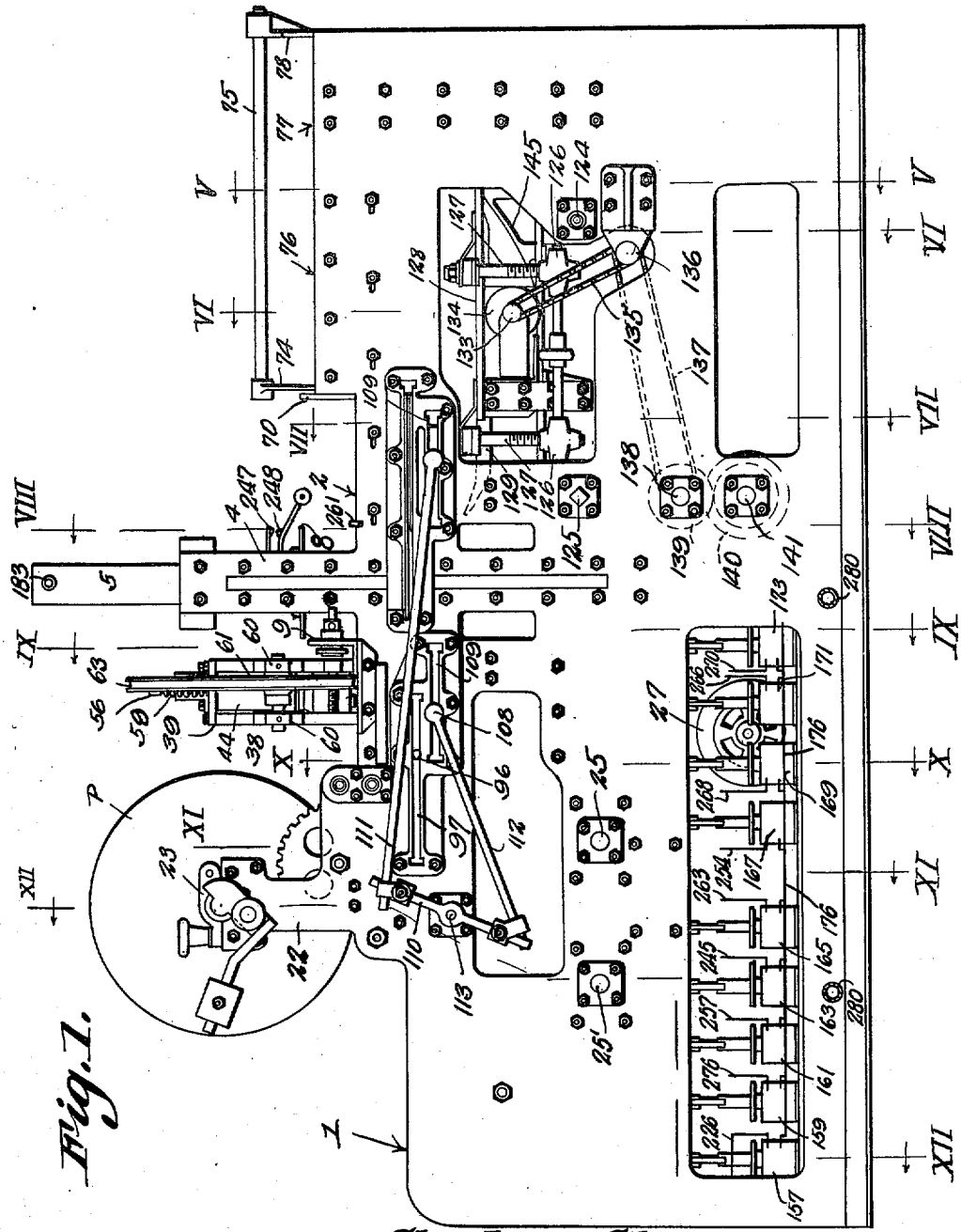


Fig. 1.

Charles Stevens INVENTOR.

BY Albert & Co.

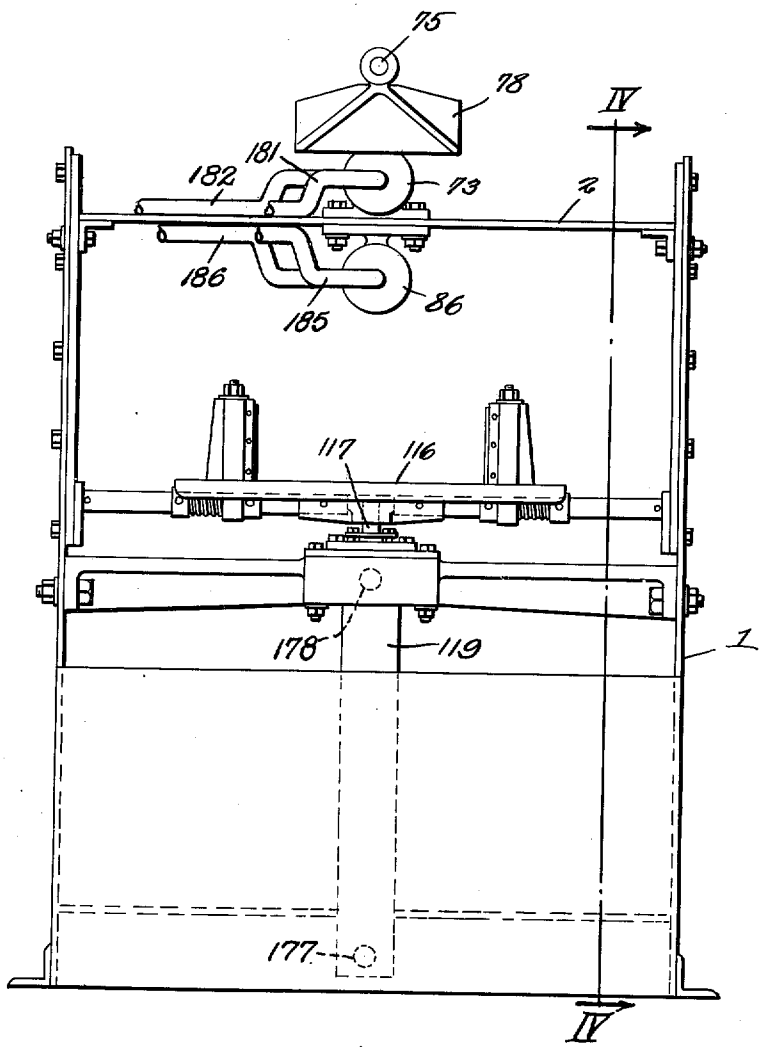
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*Fig. 2.*




*Charles Stevens*

*INVENTOR.*

*BY* Cushman & Co.

*ATTORNEYS.*

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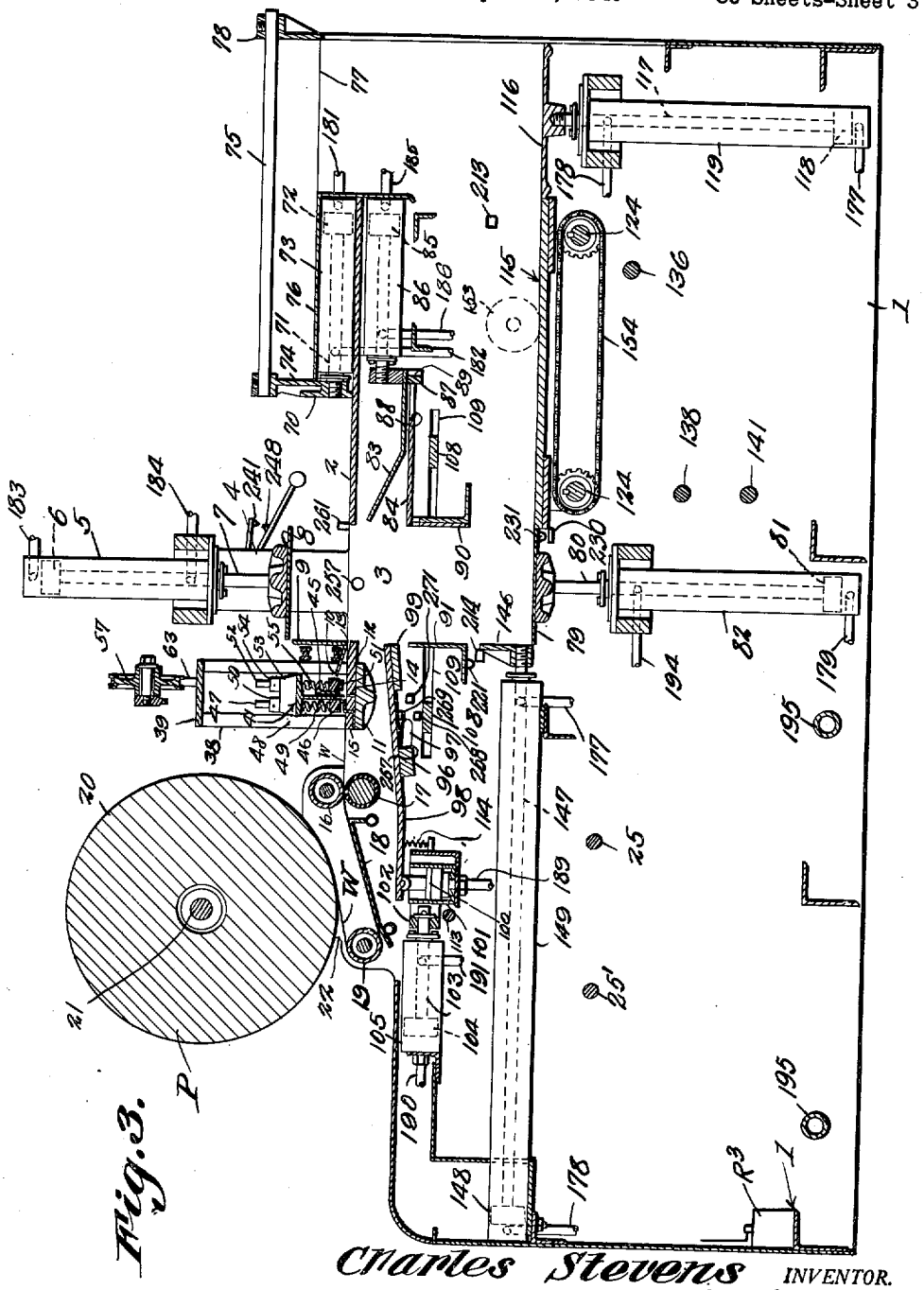


Fig. 3.

Charles Stevens INVENTOR.

BY C. A. Snow & Co.

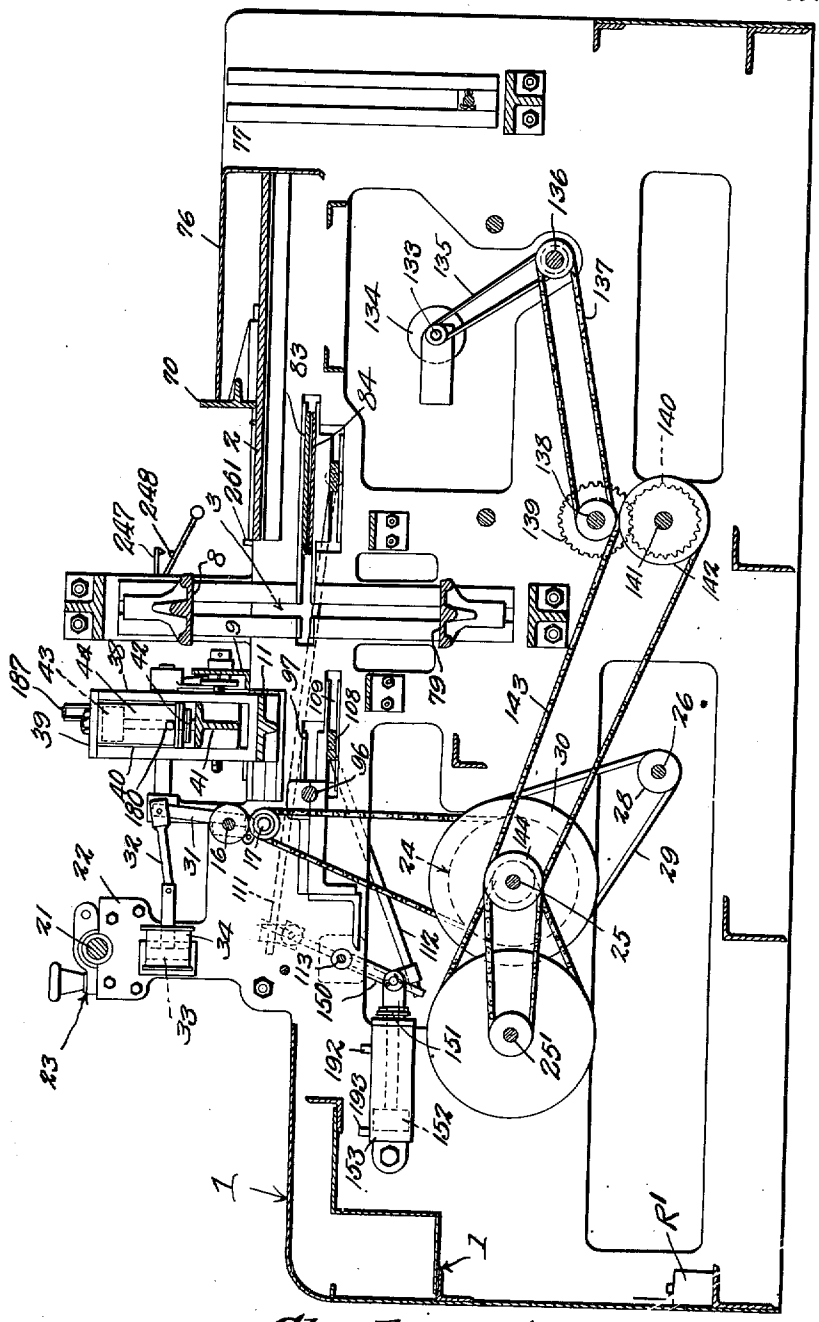
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Fig. 4.



Charles Stevens INVENTOR.

BY Brownell & Co.

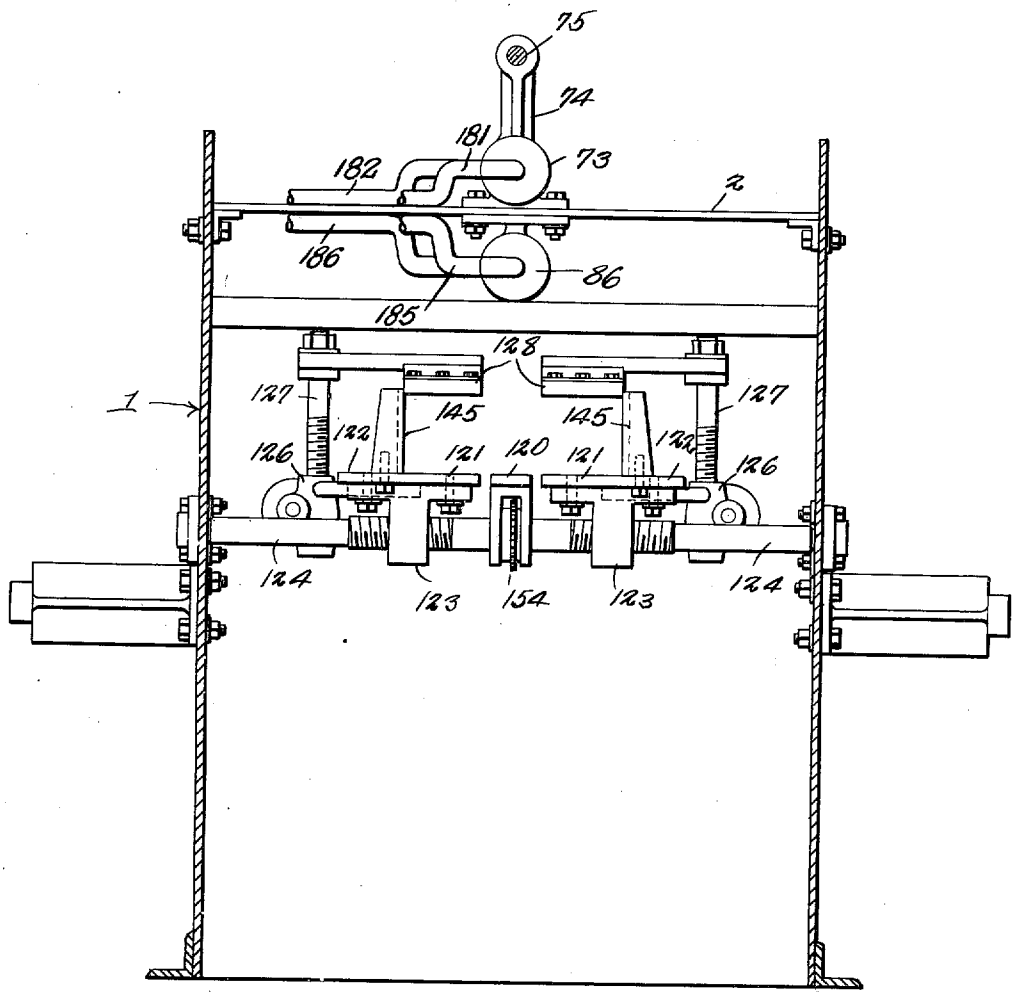
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Fig. 5.




Charles Stevens

INVENTOR.

BY C. A. Snow & Co.

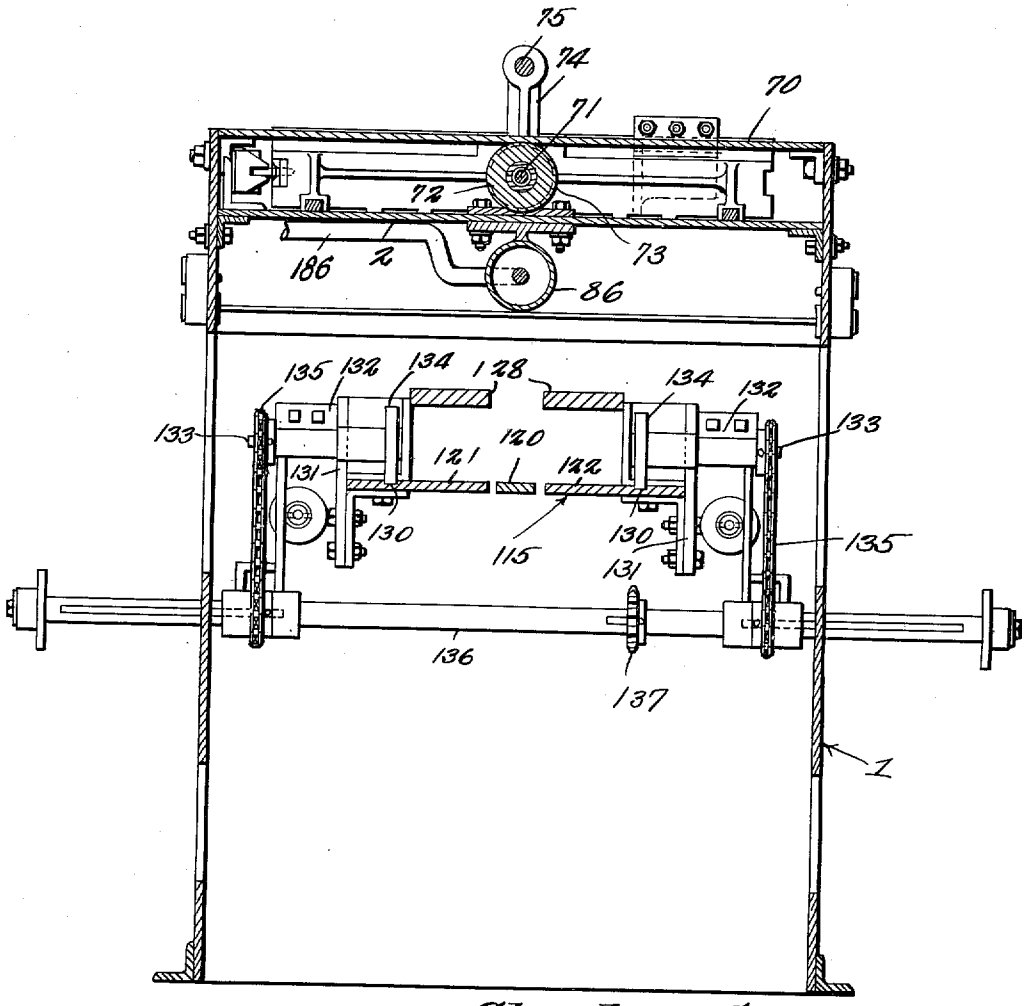
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*Fig. 6.*




*Charles Stevens*

INVENTOR.

BY *C. L. Stevens Co.*

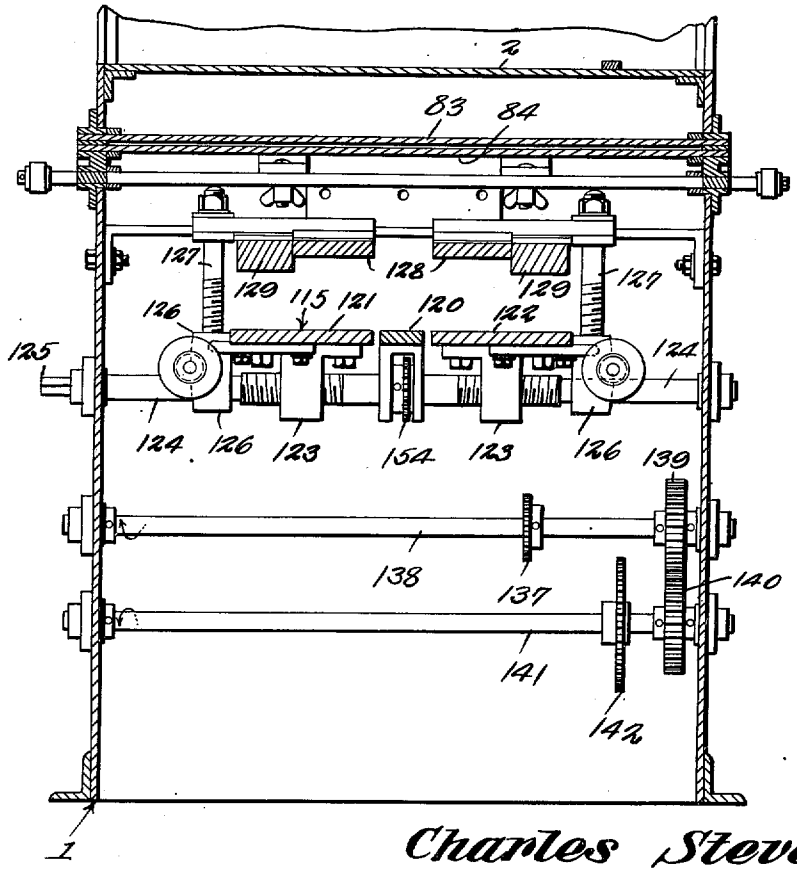
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Fig. 7.




Charles Stevens

INVENTOR.

BY Albrow & Co.

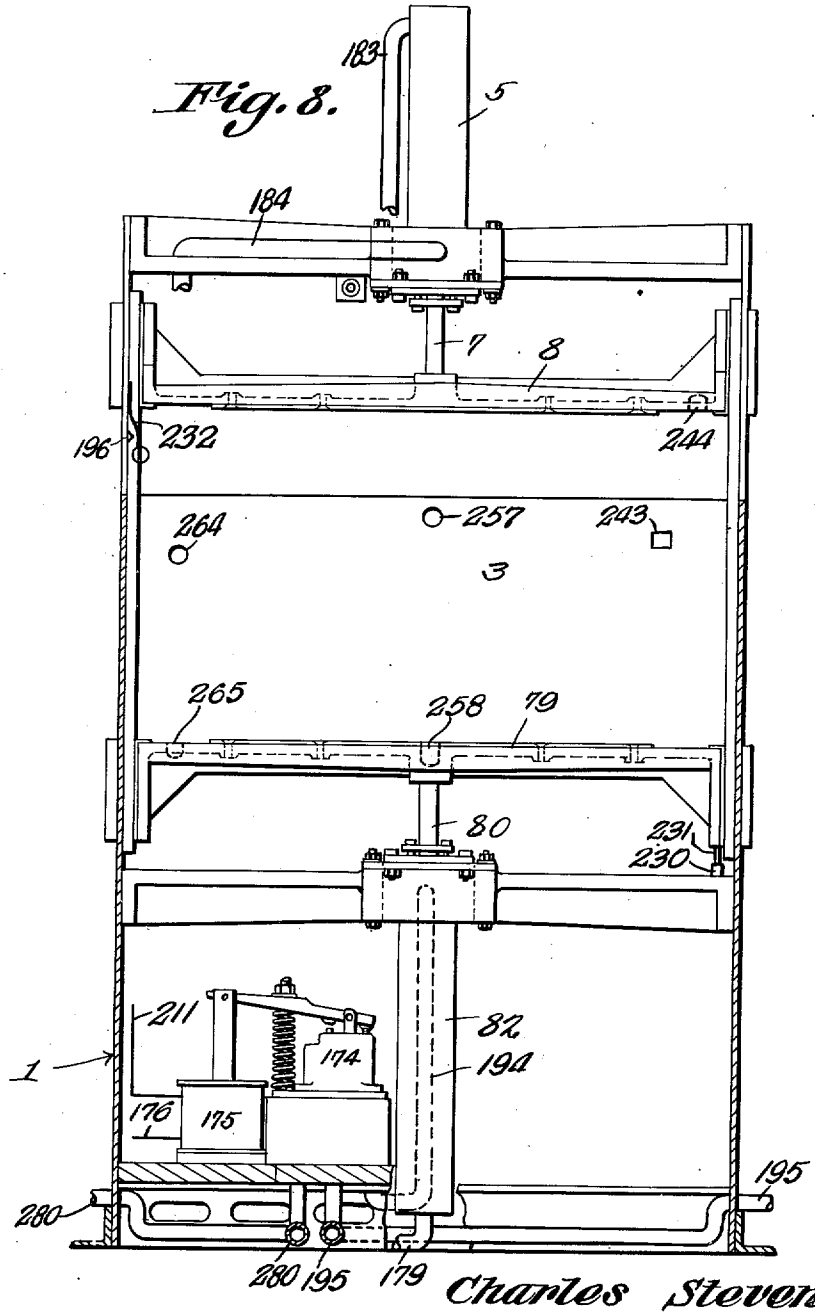
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Fig. 8.




Charles Stevens

INVENTOR.

BY Albert Co.

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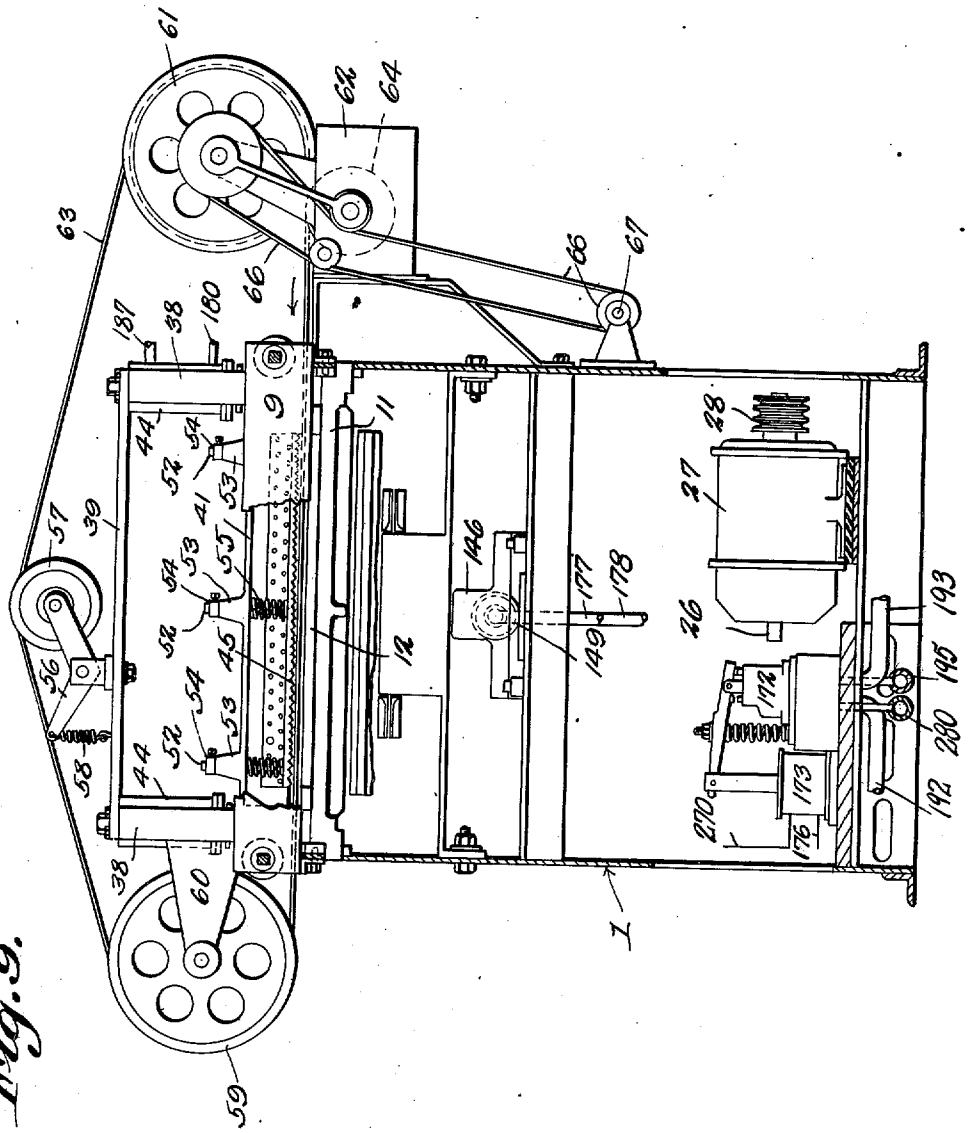



Fig. 9.

Charles Stevens

INVENTOR.

BY C. L. Snow & Co.

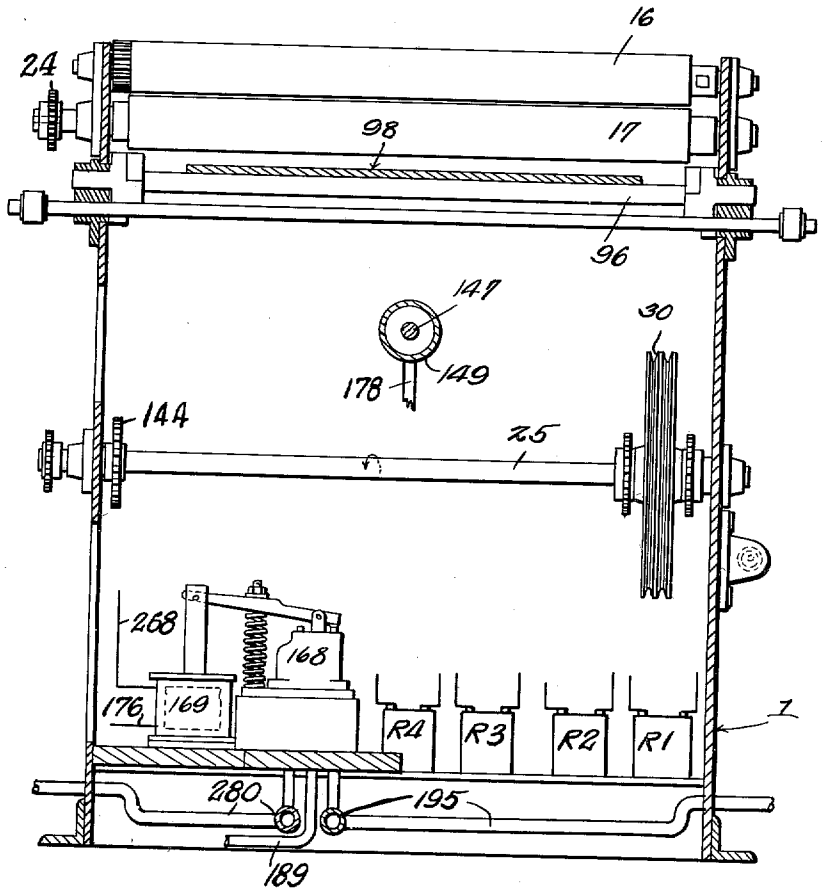
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Fig. 10.




Charles Stevens

INVENTOR.

BY C. A. Snow & Co.

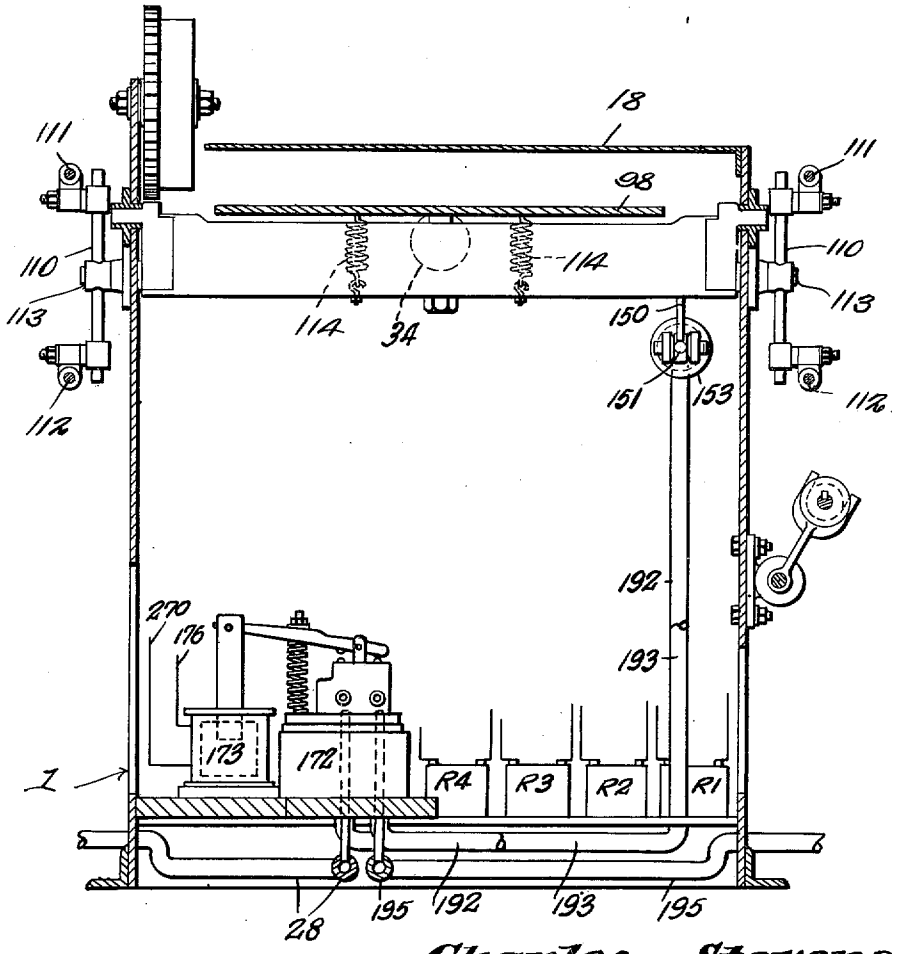
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Fig. 11.




Charles Stevens

INVENTOR.

BY C. A. Snow & Co.

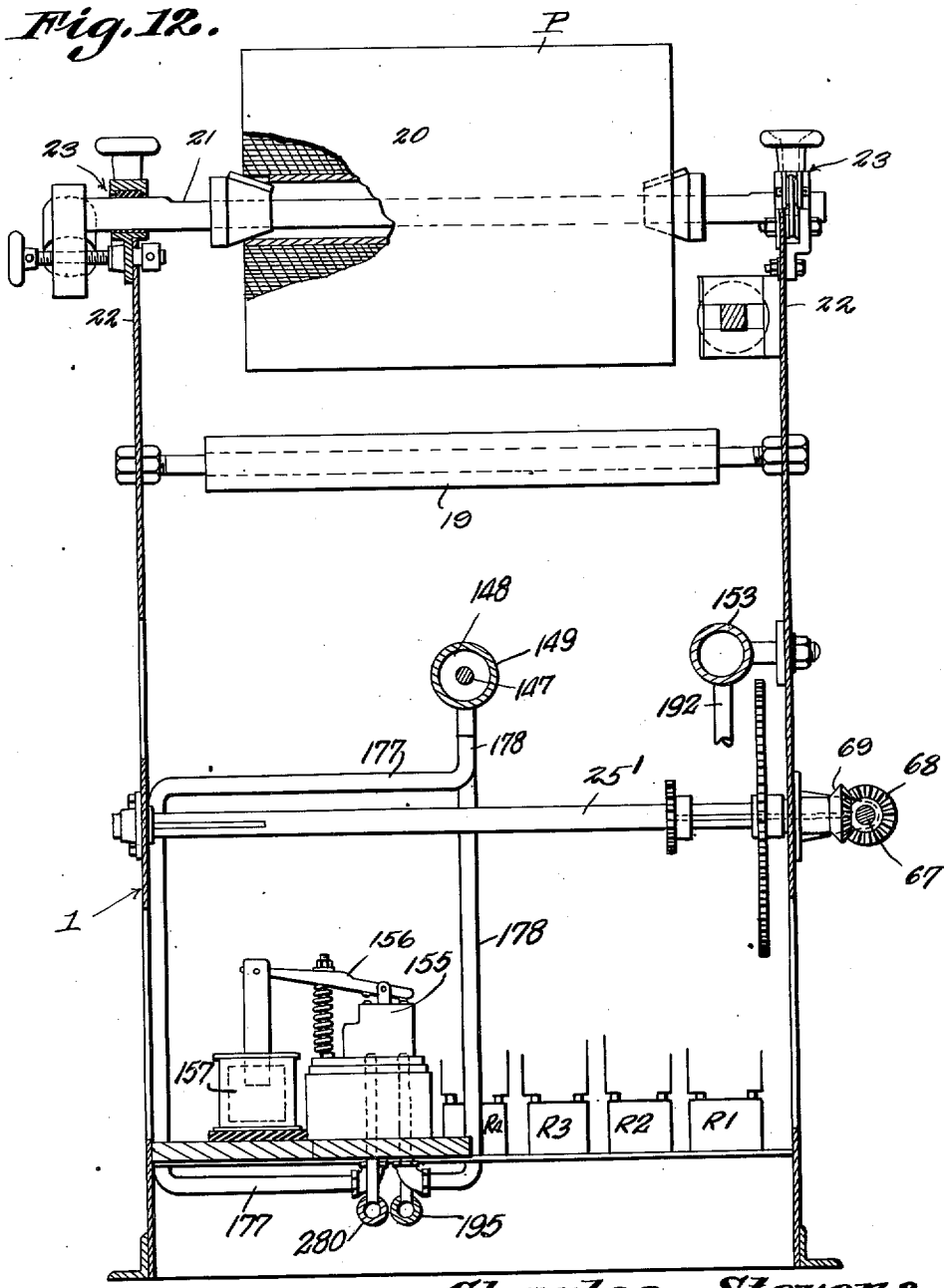
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Fig. 12.




Charles Stevens
INVENTOR.

BY Albert Co.

ATTORNEYS.

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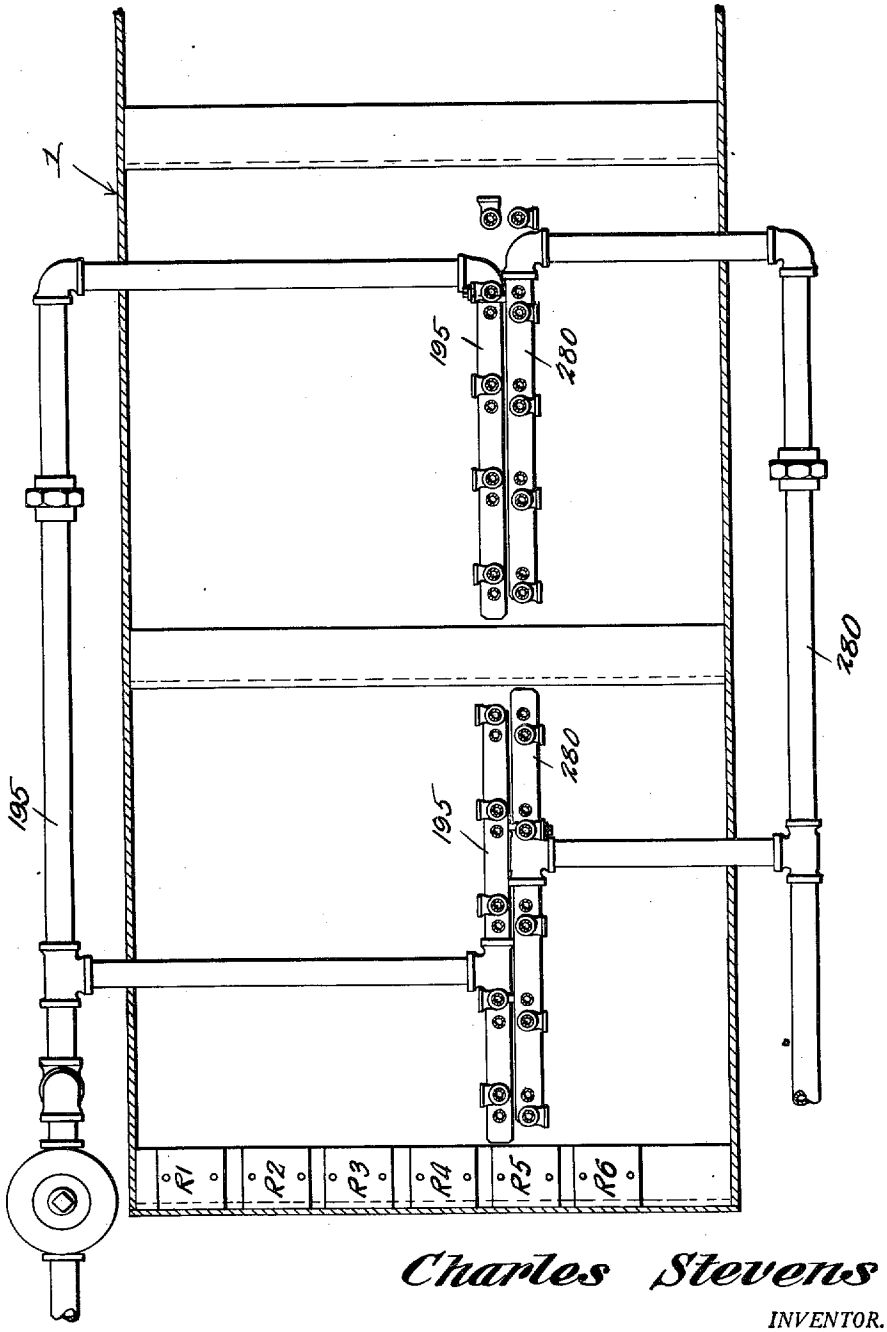



Fig. 13.

Charles Stevens

INVENTOR.

BY Albert Co.

ATTORNEYS.

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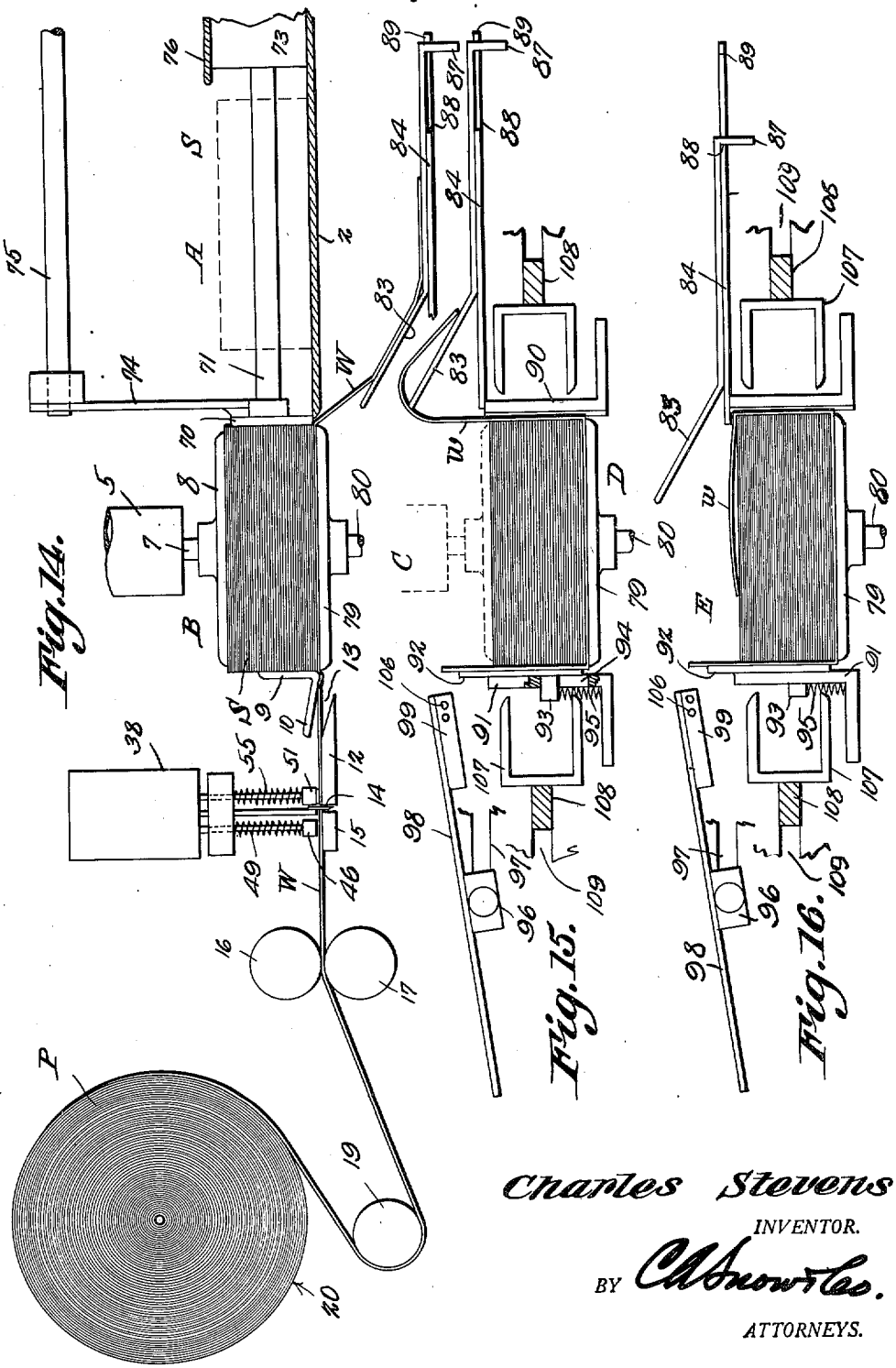


Fig. 14.

Fig. 15.

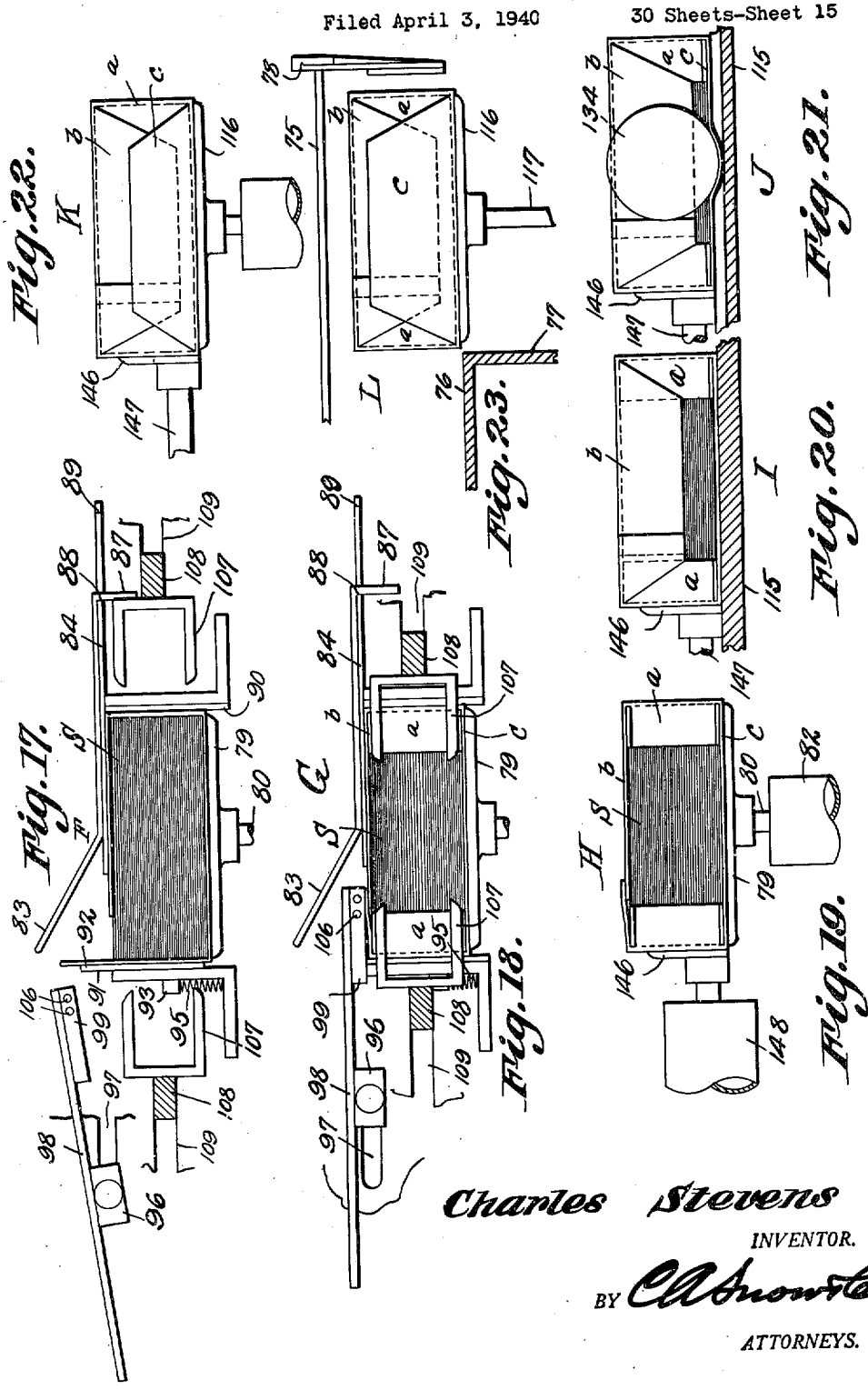
Fig. 16.

Charles Stevens
INVENTOR.
BY C. A. Snow & Co.
ATTORNEYS.

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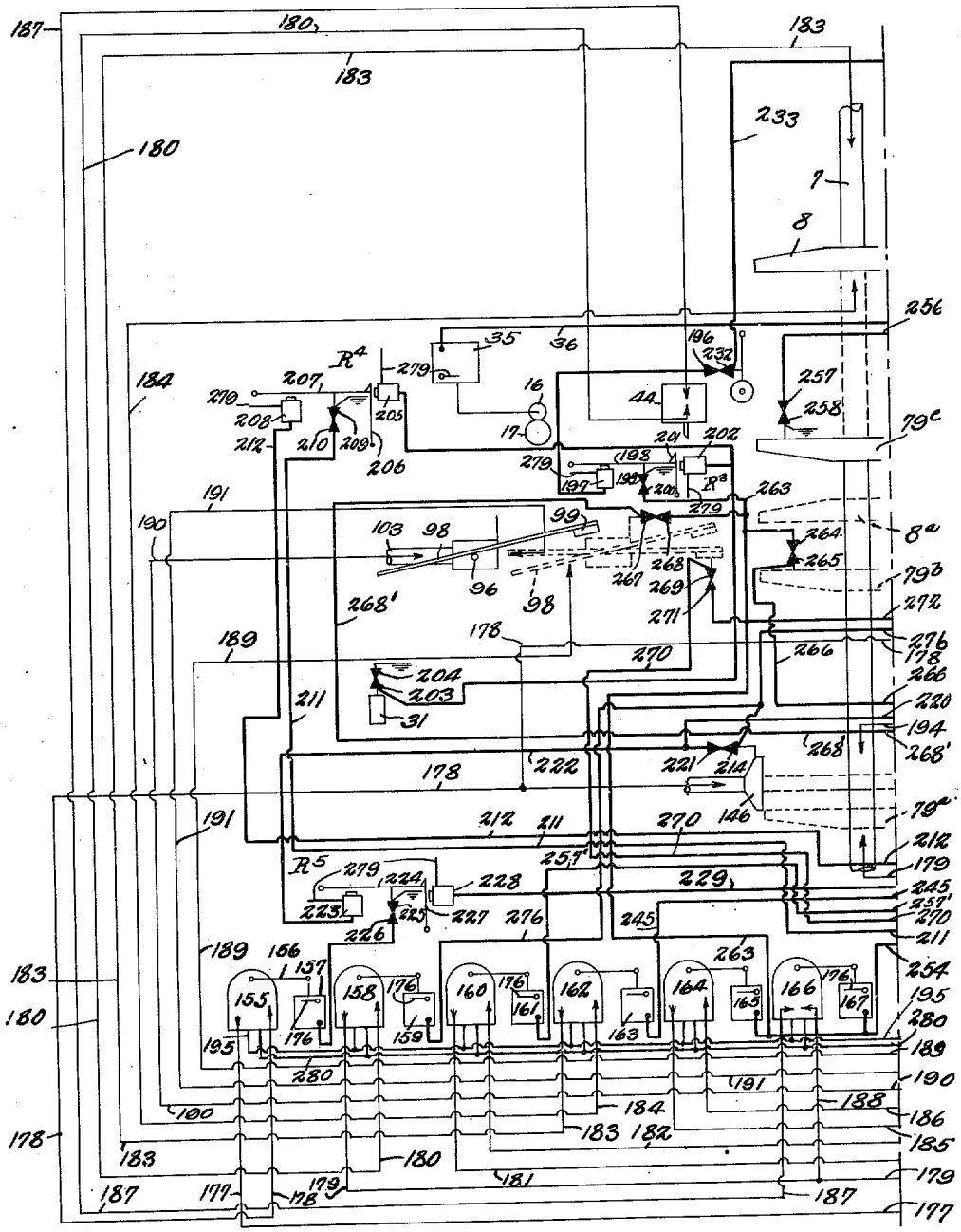



Charles Stevens
INVENTOR.
BY C. A. Snow & Co.
ATTORNEYS.

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Charles Stevens INVENTOR.

BY Albert Co.

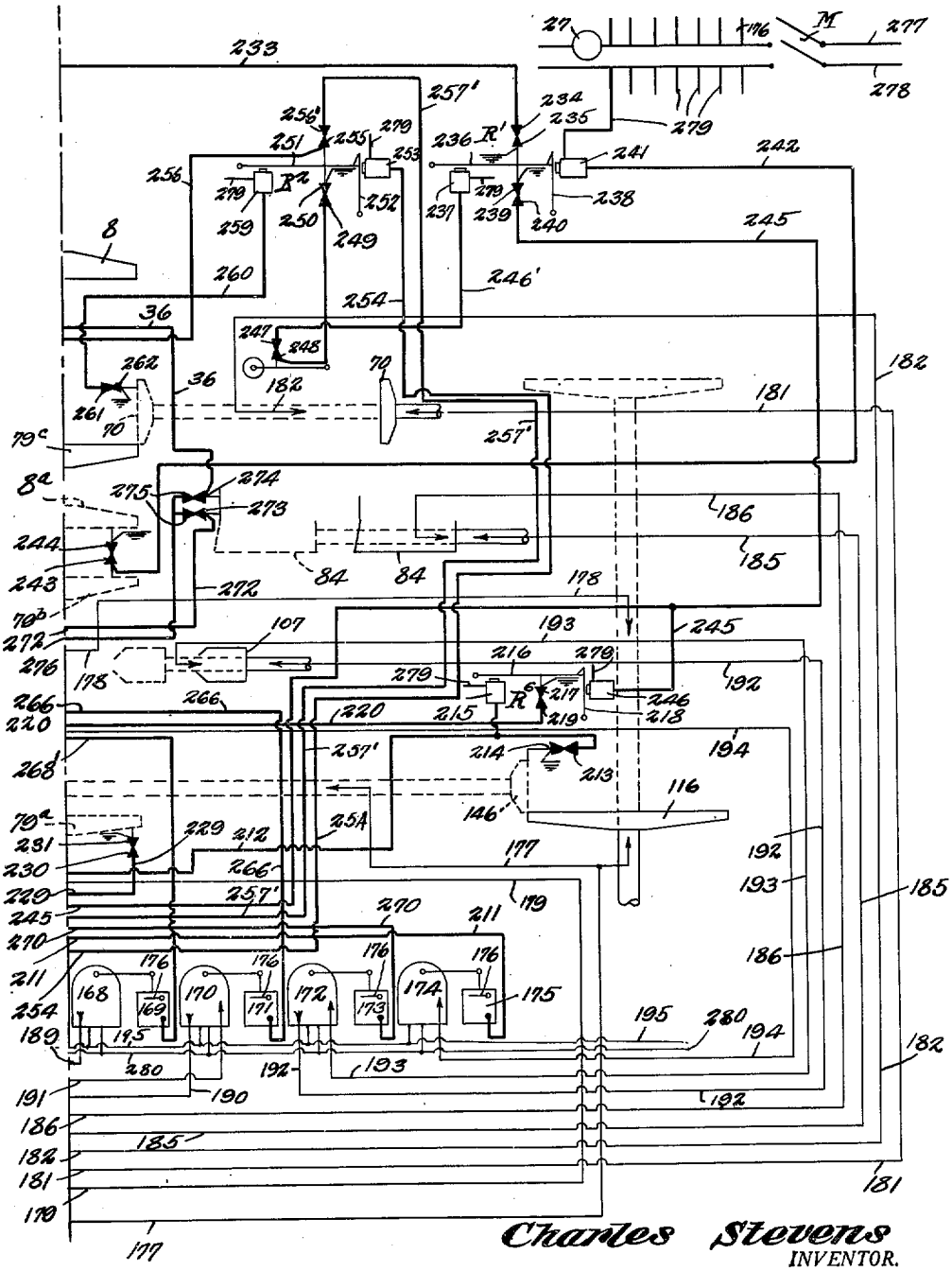
ATTORNEYS.

Fig. 24.

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Charles Stevens
INVENTOR.

Fig. 24a

BY C. Knowles.
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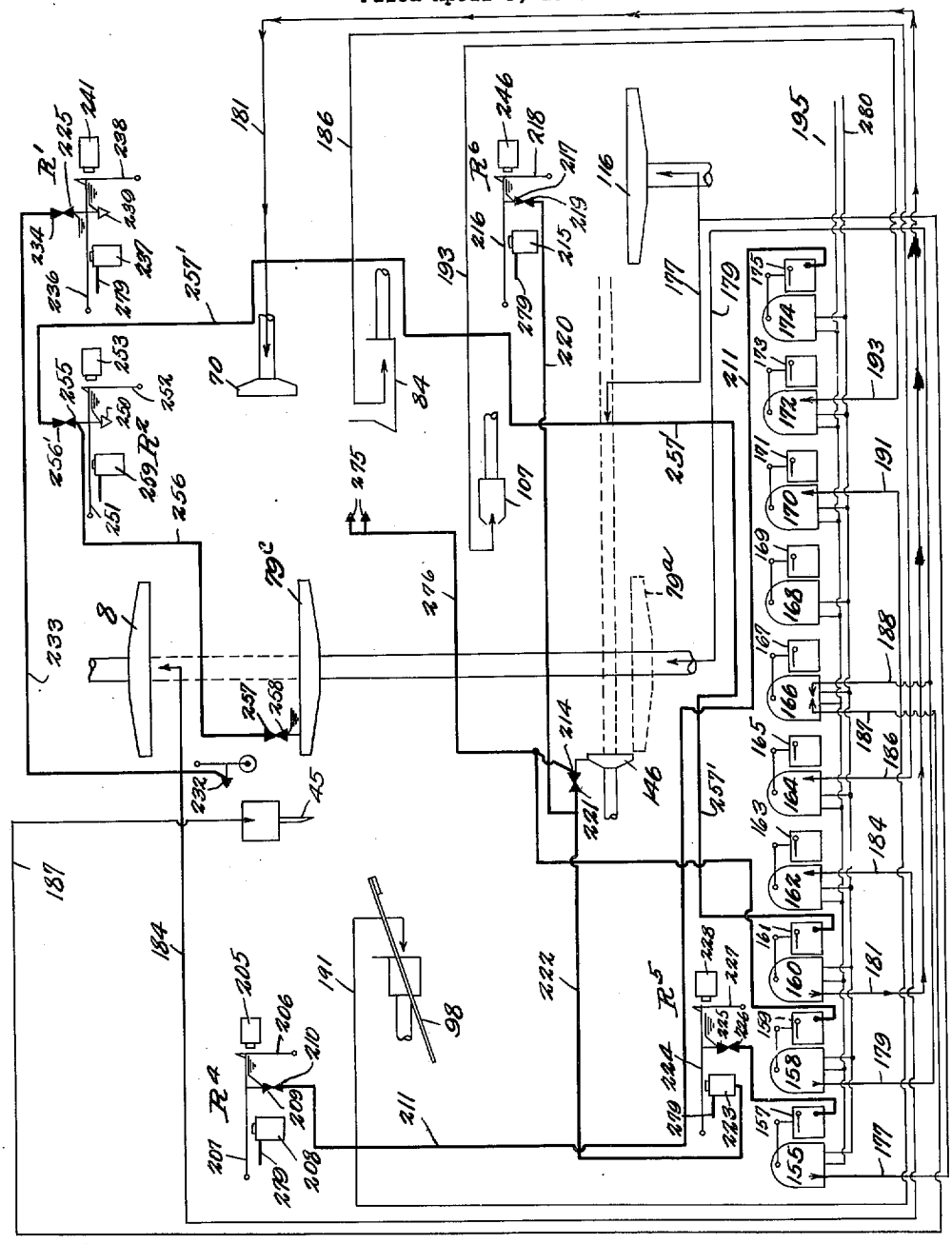


Fig. 25.

Charles Stevens INVENTOR.

BY Albert Les.

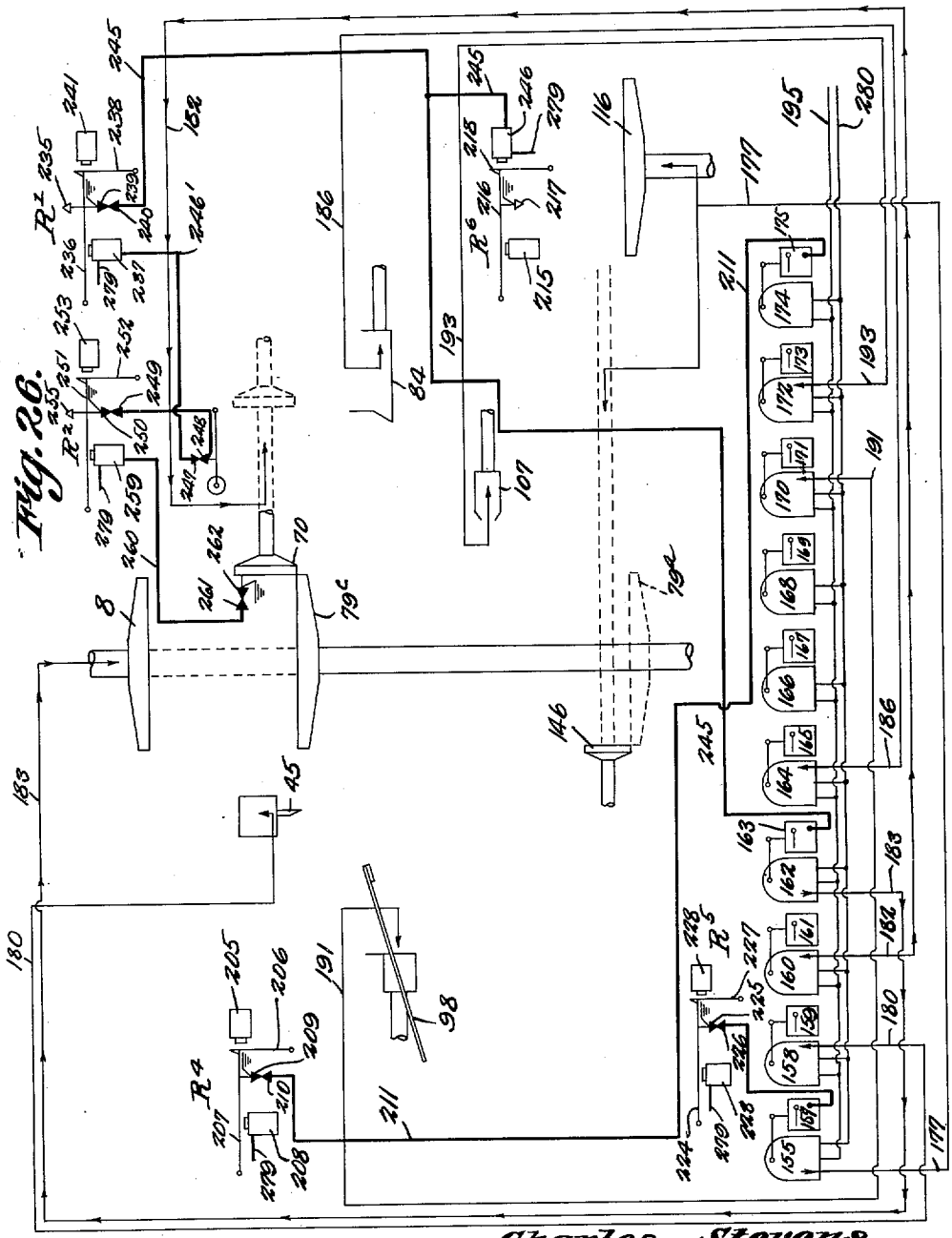
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Fig. 26.



Charles Stevens
INVENTOR.

BY C. C. Stevens.

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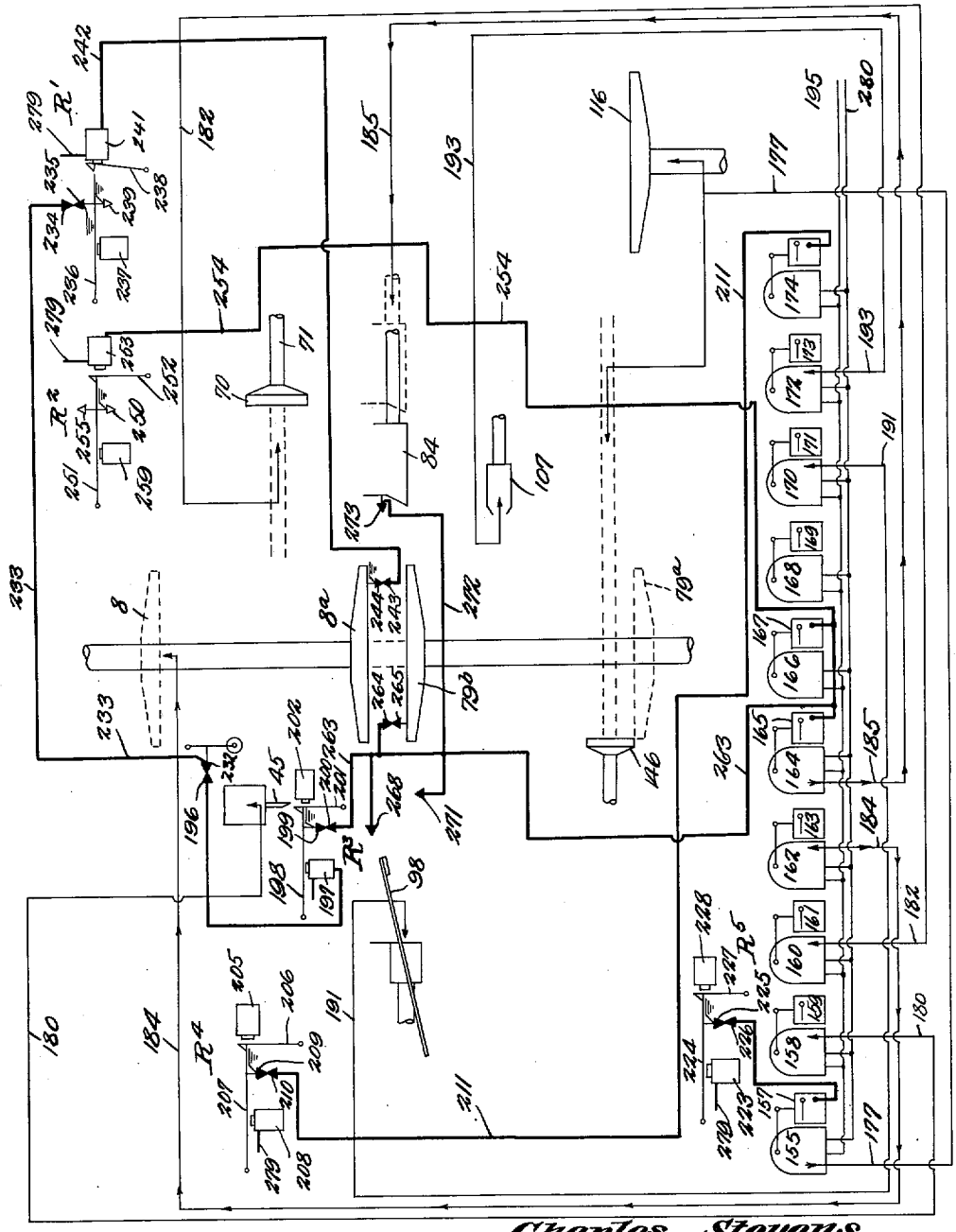


Fig. 27.

Charles Stevens
INVENTOR.

BY C. A. Brooks.
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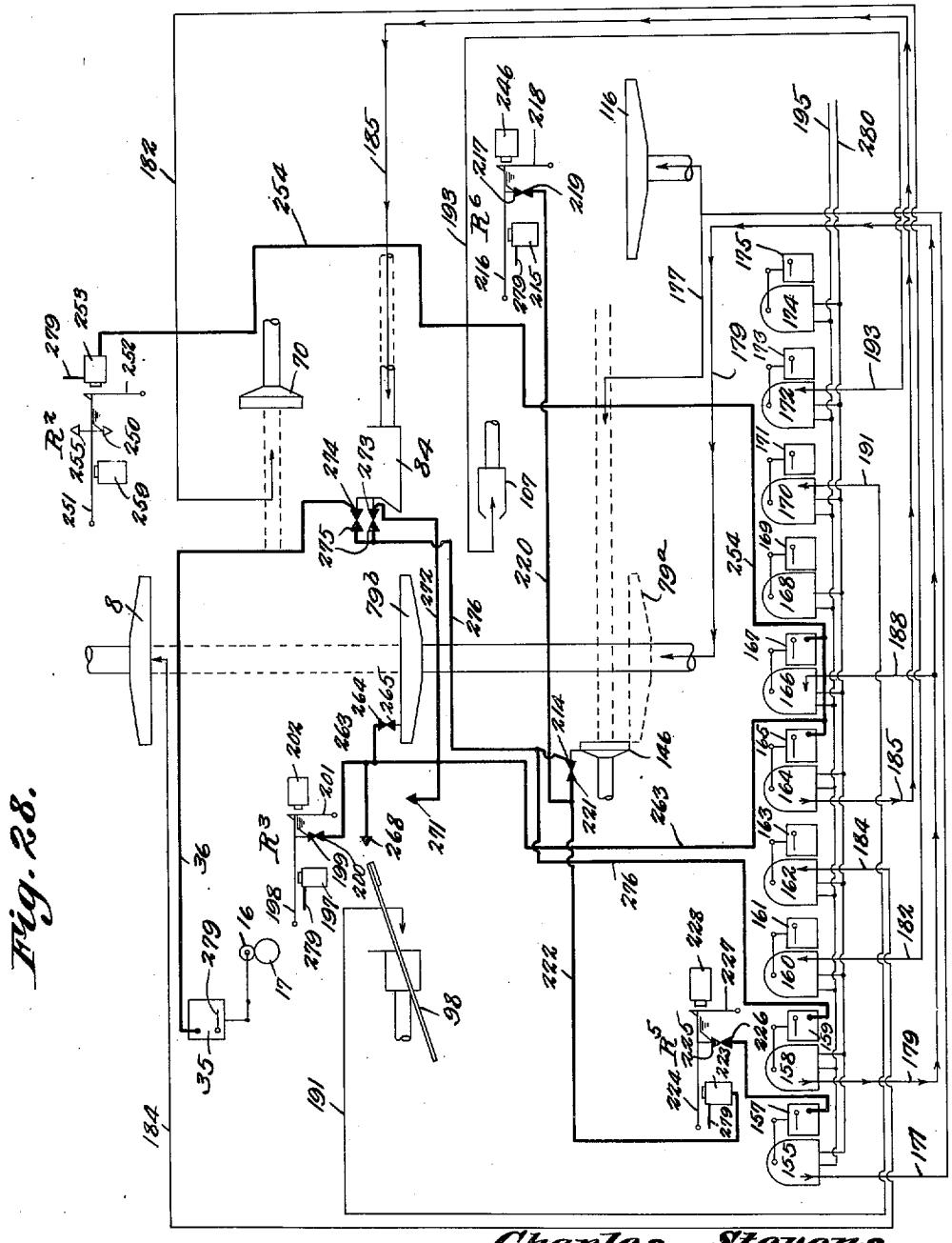


Fig. 28.

Charles Stevens
INVENTOR.

BY Cushman & Co.

ATTORNEYS.

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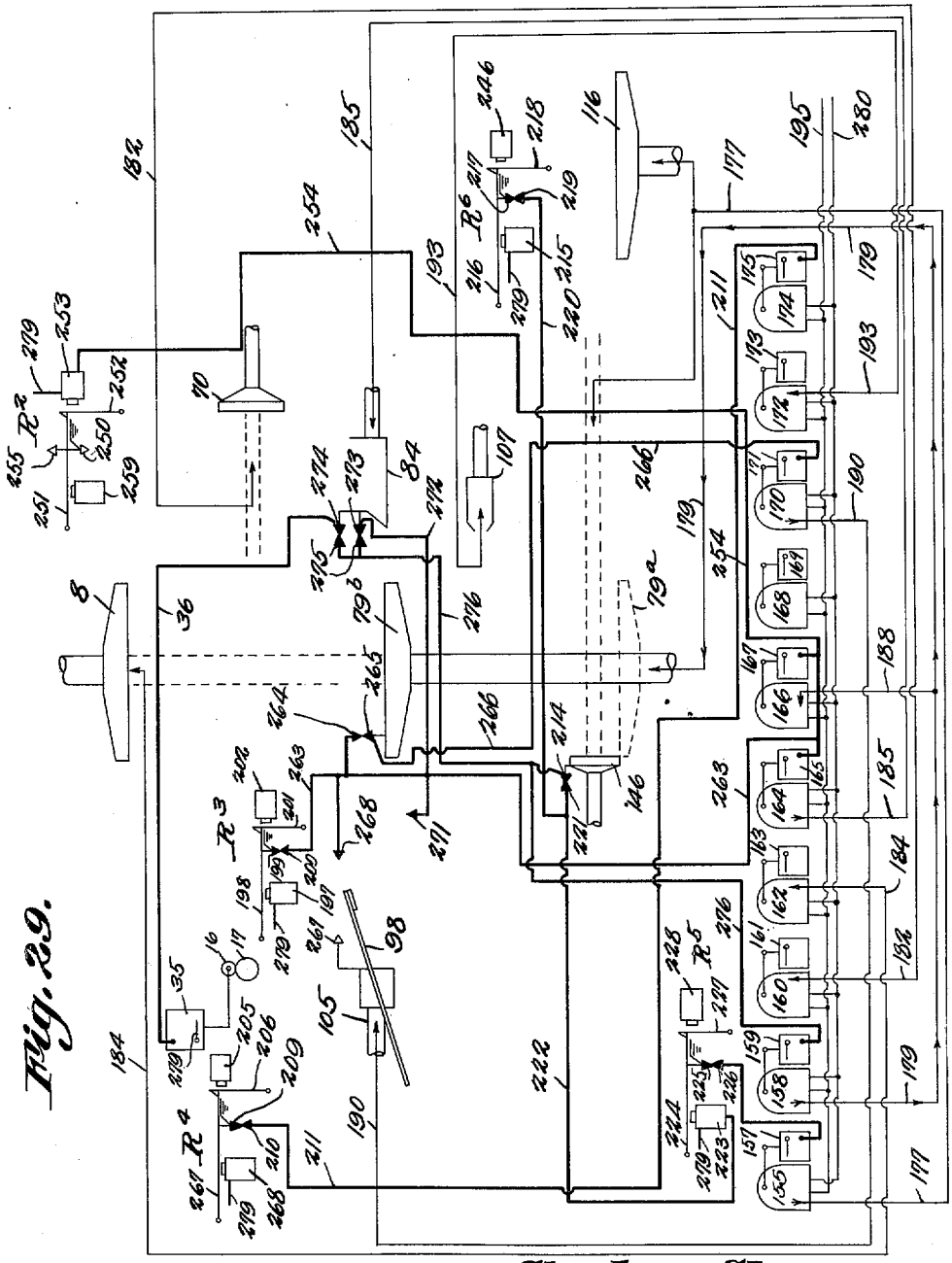


Fig. 29.

Charles Stevens
INVENTOR.

BY C. A. Snow & Co.

ATTORNEYS.

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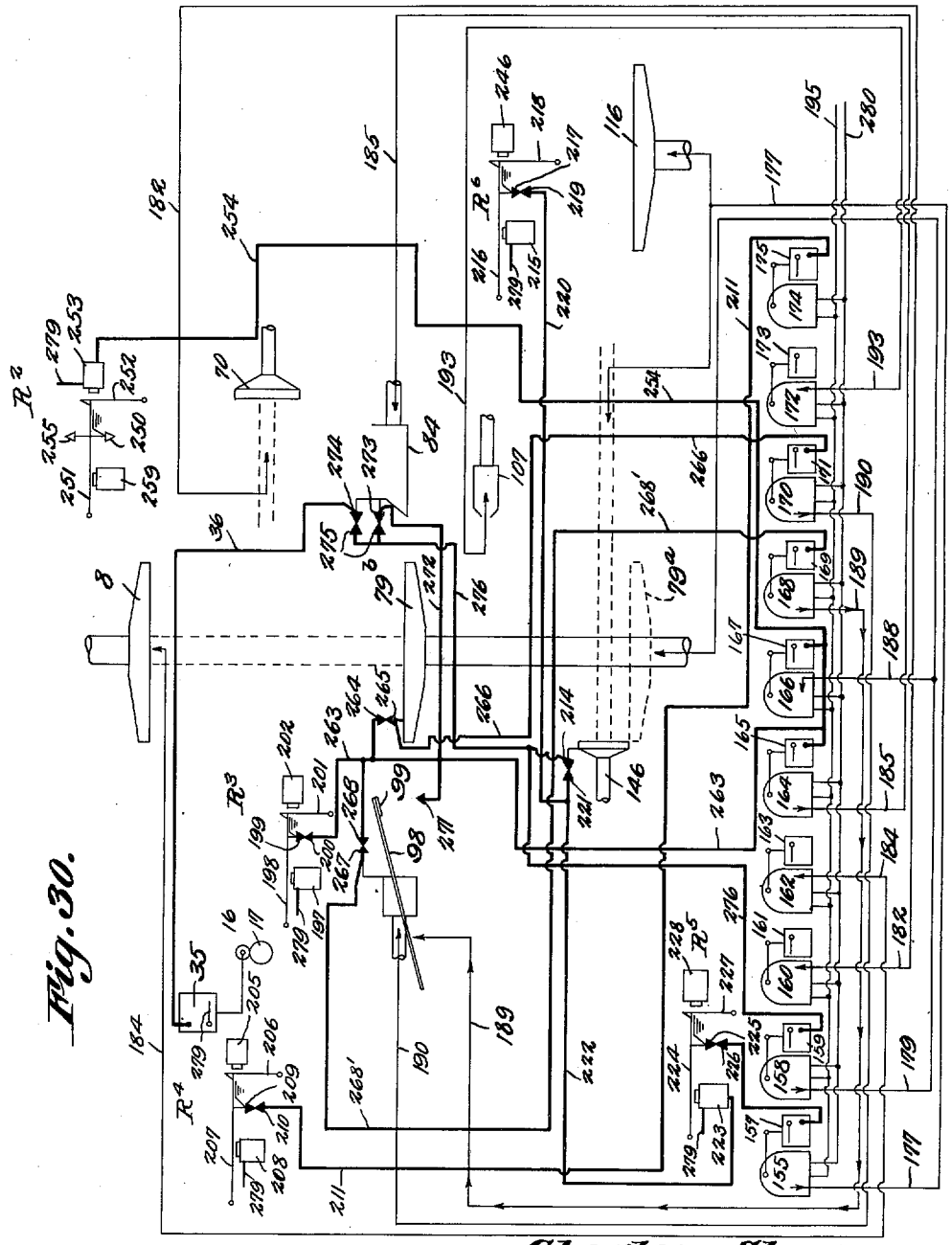


Fig. 30.

Charles Stevens
INVENTOR.

BY Albert Lee.

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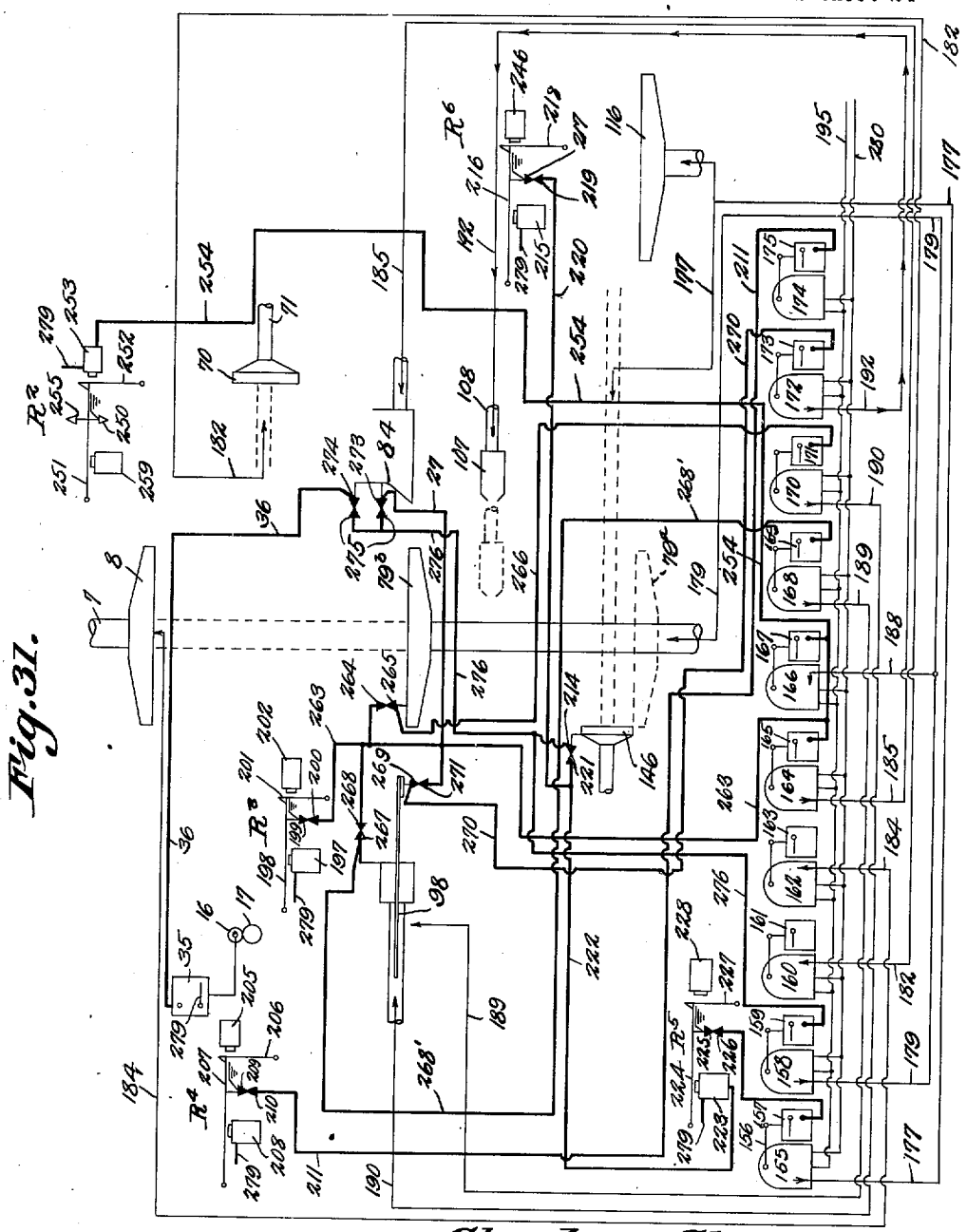


Fig. 31.

Charles Stevens
INVENTOR.

BY C. A. Snow & Co.

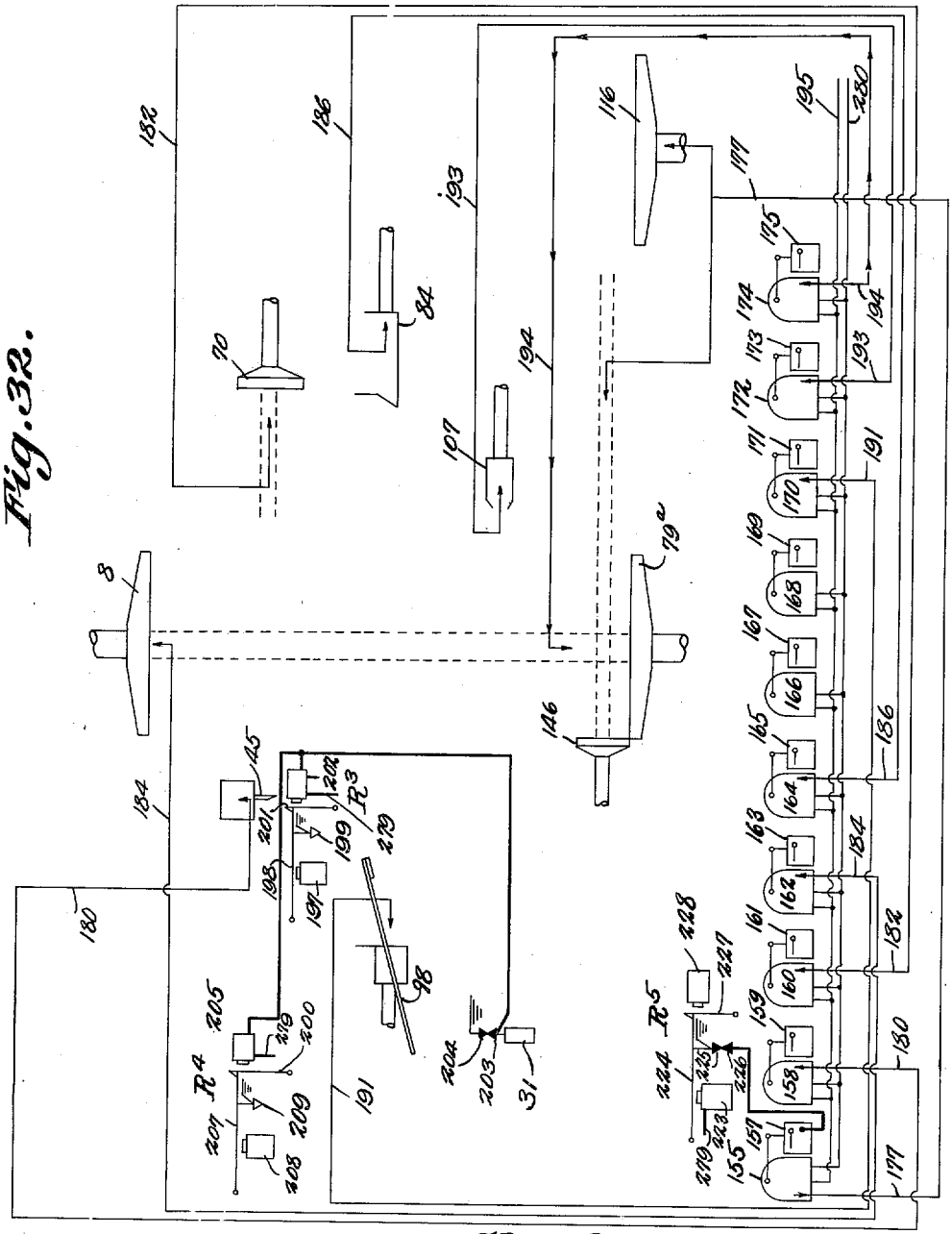
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Fig. 32.



Charles Stevens
INVENTOR.

BY C. L. Brown & Co.

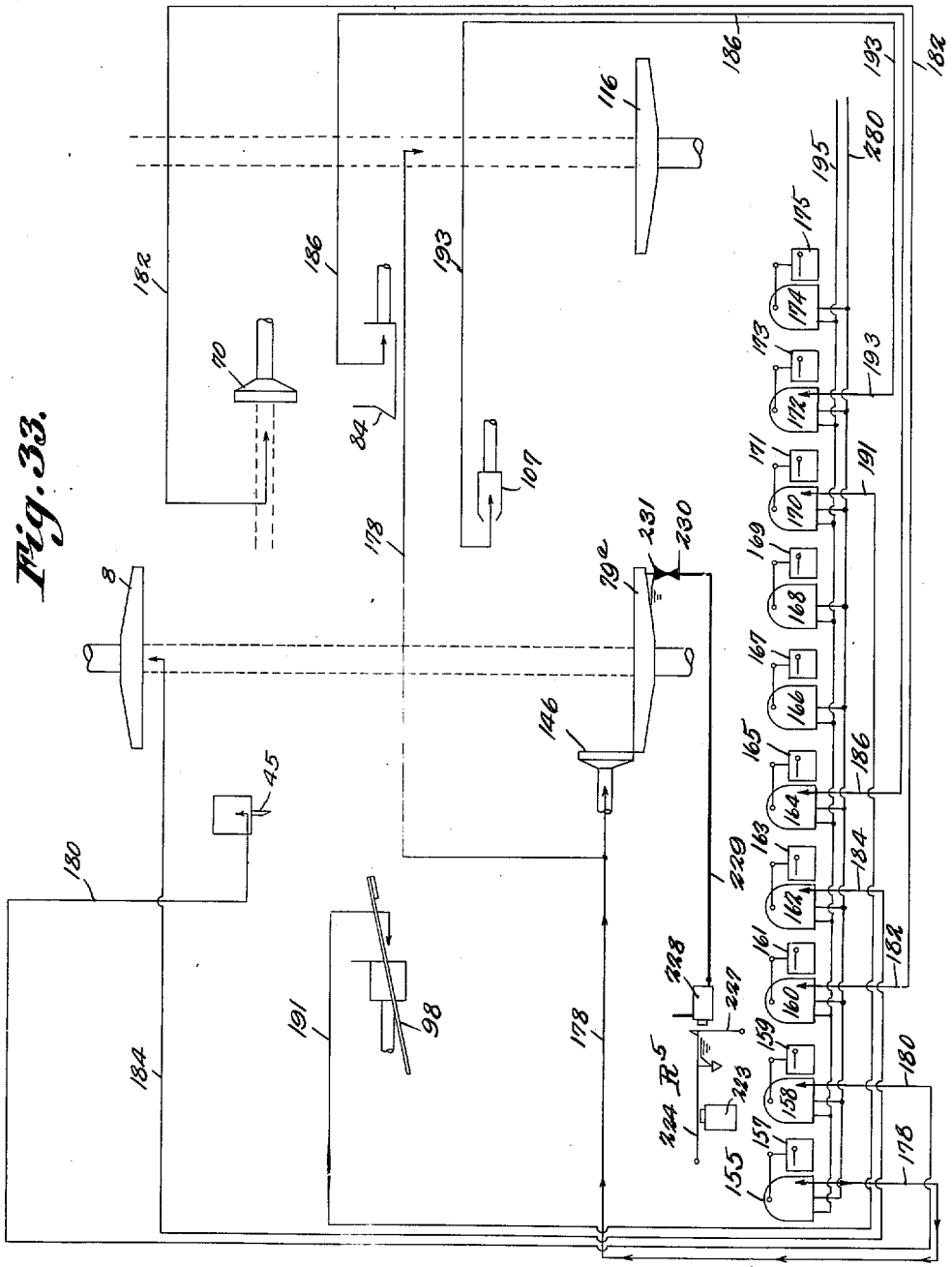
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Fig. 33.




Charles Stevens INVENTOR.

BY C. A. Snow & Co.

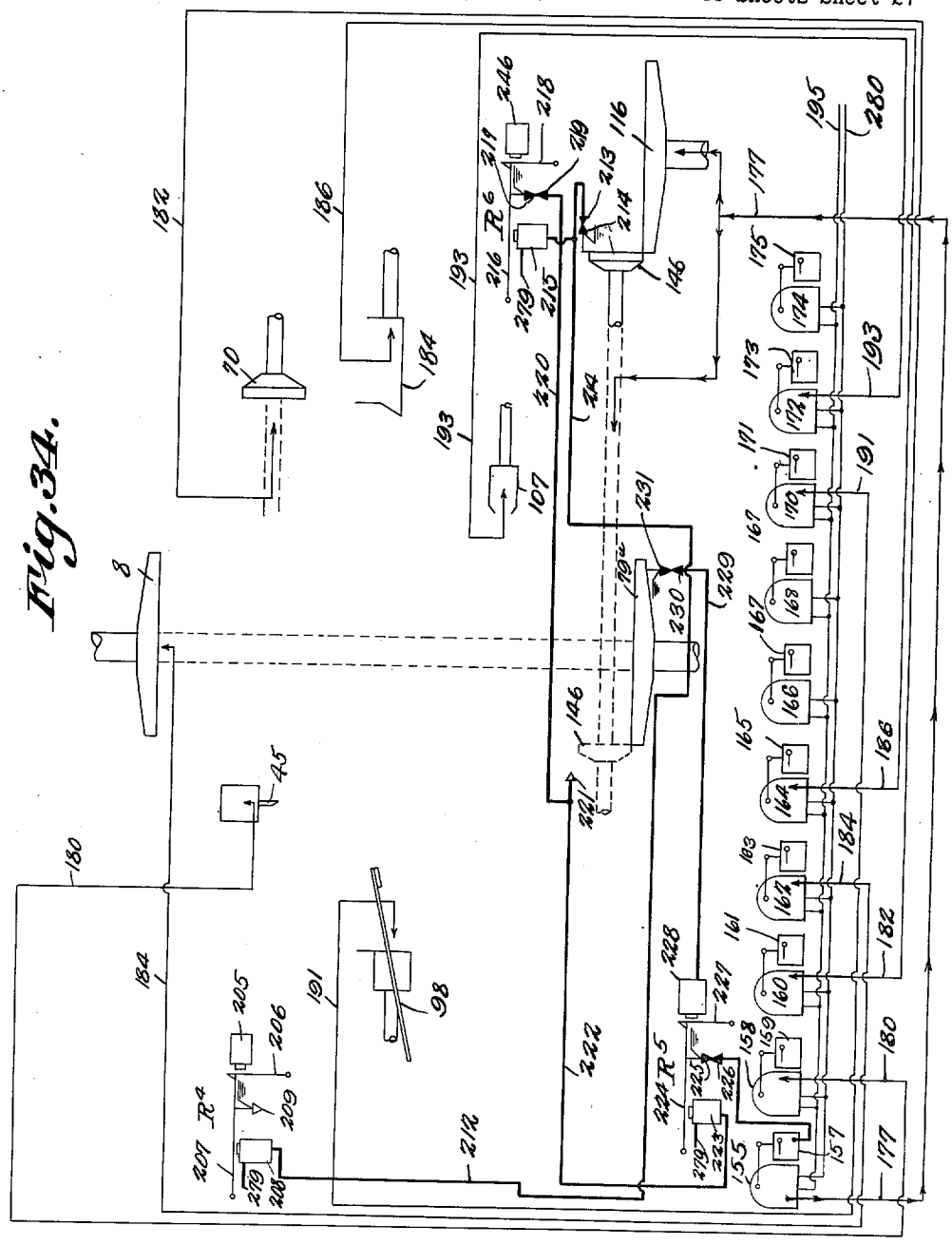
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Fig. 34.



Charles Stevens INVENTOR.

BY Albrow Bros.

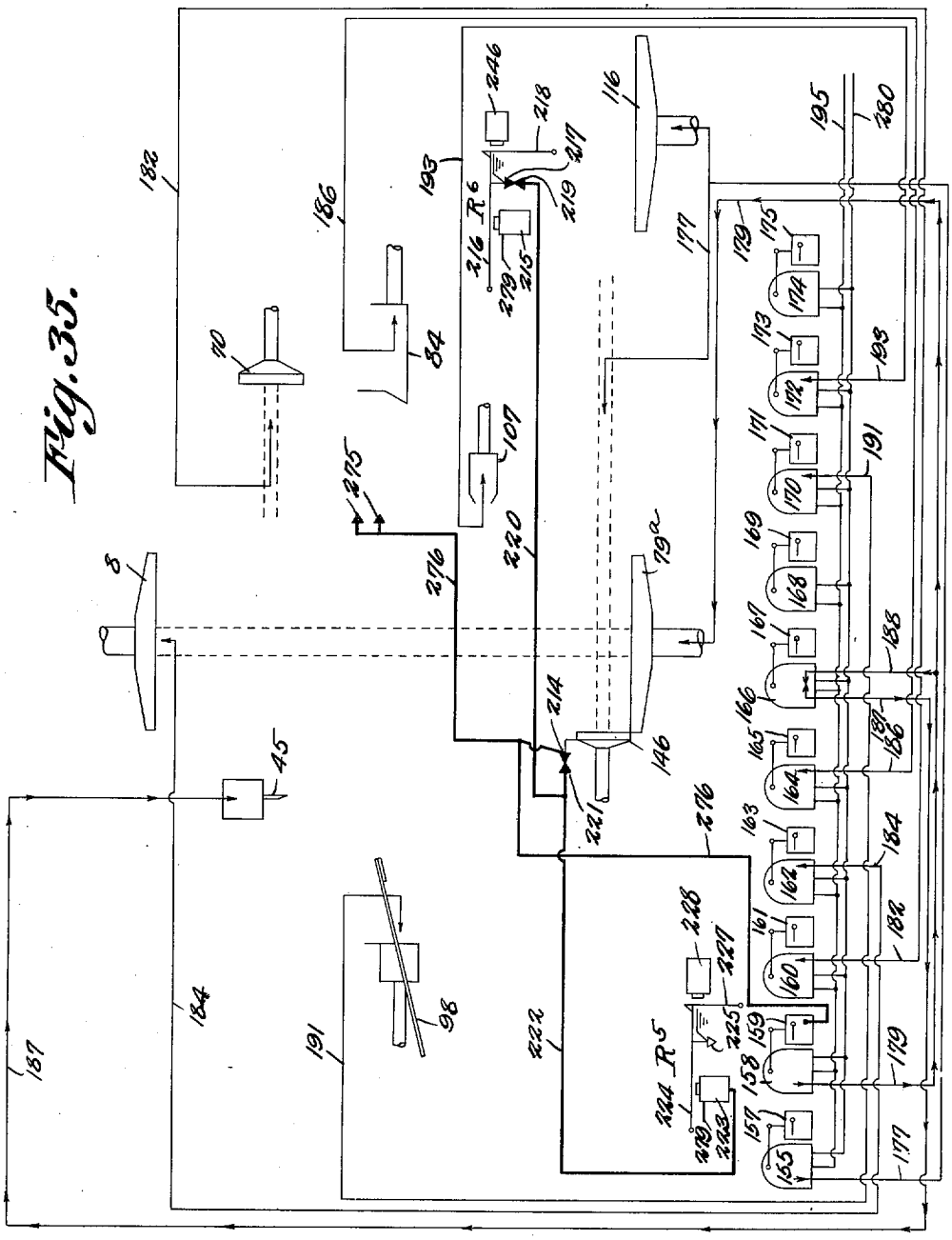
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Fig. 35.



Charles Stevens INVENTOR.

BY Albrecht.

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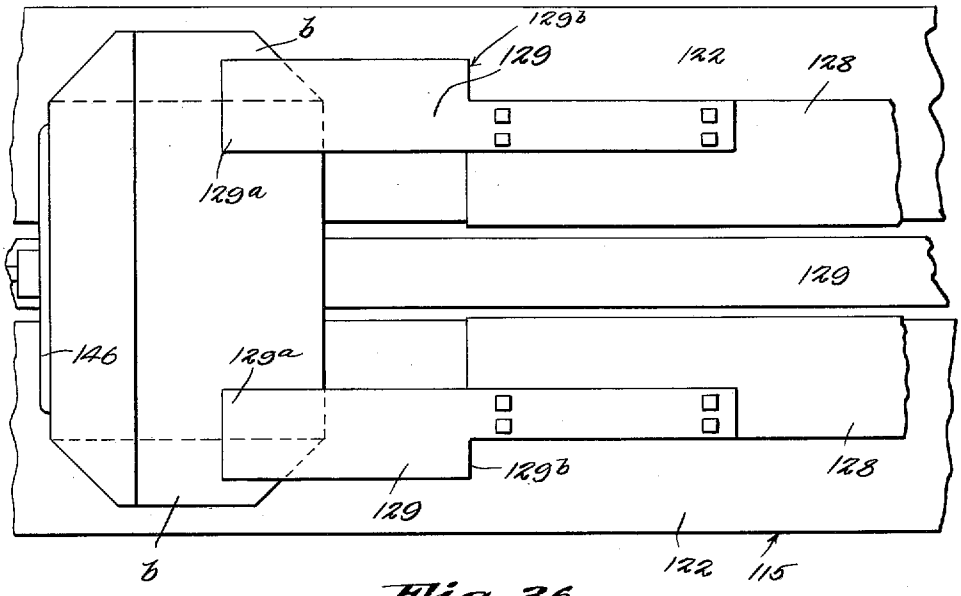



Fig. 36.

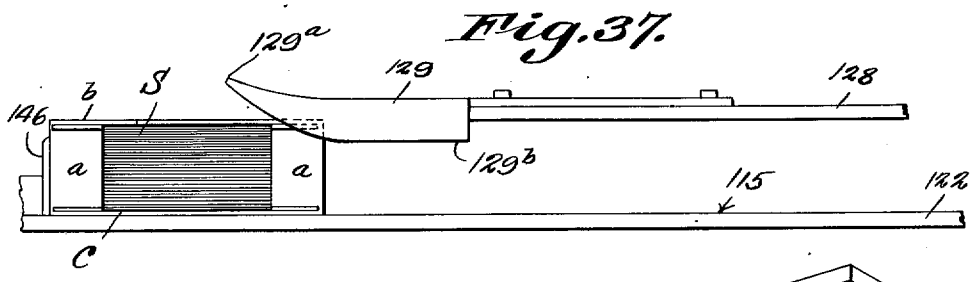



Fig. 37.

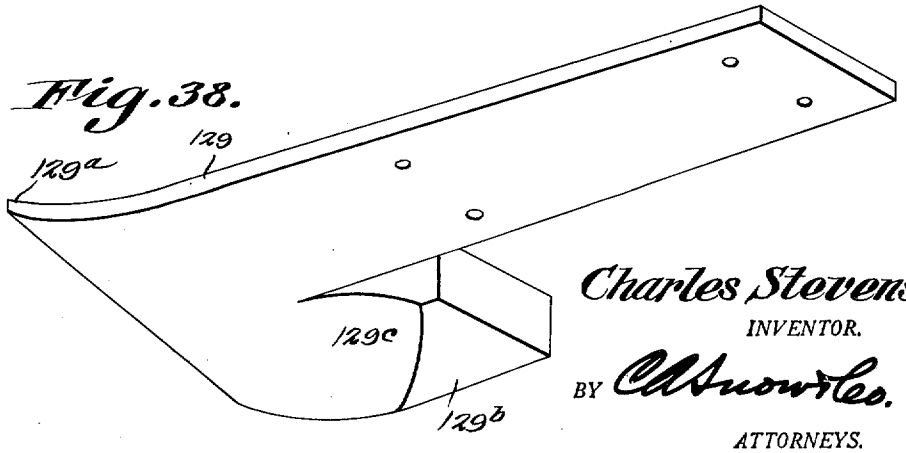



Fig. 38.

Charles Stevens
INVENTOR.
BY C. A. Snow & Co.
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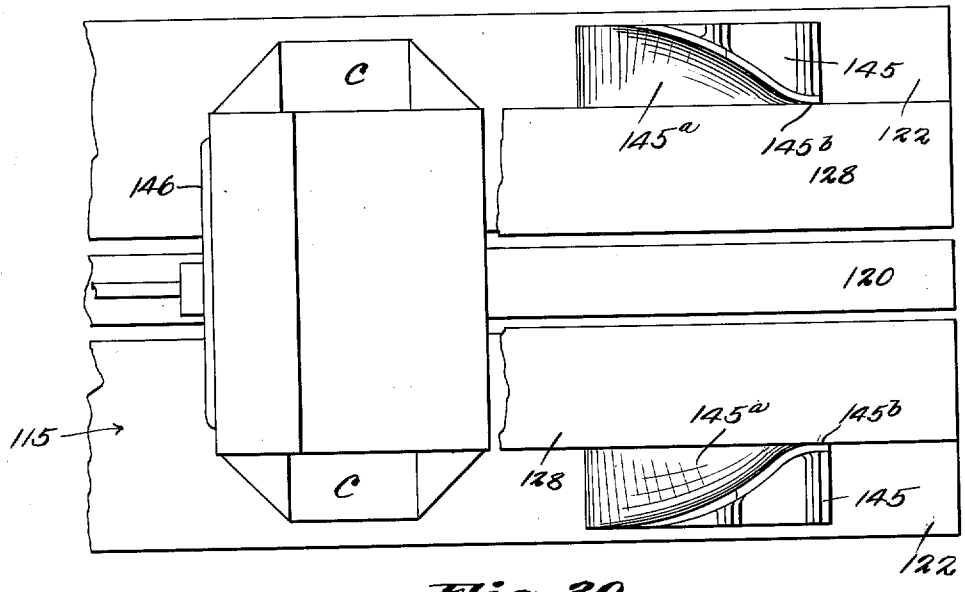



Fig. 39.

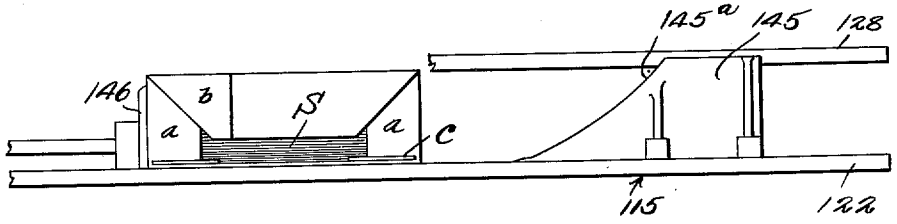



Fig. 40.

Charles Stevens

INVENTOR.

BY C. A. Snow & Co.

ATTORNEYS.

Patented Aug. 11, 1942 2,292,487

# UNITED STATES PATENT OFFICE

2,292,487

## MACHINE FOR WRAPPING PAPER

Charles Stevens, Wellston, Ohio

Application April 3, 1940, Serial No. 327,700

36 Claims. (Cl. 93—2)

This invention relates to a machine designed primarily for wrapping stacks of loose sheets of paper.

Heretofore it has been the general practice to wrap paper sheets by hand, except under conditions where paper of an inferior grade is being packaged.

As is well known to those skilled in the art, it is seldom that two packages of loose paper sheets prepared for the market are of the same thickness. This is due to various conditions. In the first place it is seldom true that the same number of sheets are in all packs. Consequently should the packs of paper be supplied to a wrapping machine, there would be variations in the thickness of the packs to be wrapped and these variations would result in some packs being tightly wrapped and other packs loosely wrapped. Furthermore, when a pack of loose sheets of paper are handled within a machine, it is essential that the handling be such as to prevent any of the sheets from shifting relative to each other prior to or during the wrapping operation. Otherwise some of the sheets in the package will become wrinkled, bent at the edges, or torn and the package would therefore be rejected by the purchaser.

It has also been found that even though separate packs of paper should contain the same number of sheets, changing climatic conditions will cause the sheets to swell so that while a machine might be adjusted at one time to wrap a pack of a predetermined number of sheets, it would not operate efficiently under other atmospheric conditions for wrapping another stack having the same number of sheets.

Changes in the thickness of a stack of loose sheets of paper is also caused by air which is trapped between the sheets when they are superimposed in the formation of the stacks. With air thus trapped between the sheets it is impossible ordinarily to automatically wrap the sheets so tightly that they will not shift within the package and become bent or otherwise mutilated during or following the wrapping operation.

An object of the present invention is to provide a means whereby a stack of loose sheets of paper, when placed in the machine, will be subjected to heavy pressure so that any air which may have been trapped between the sheets will be expelled therefrom in order that a compact laminated package will thus be produced, and the danger of the sheets remaining loose in the package after it is wrapped is thus eliminated.

It is a further object of the invention to provide a machine which will operate automatically upon stacks of loose sheets of paper in proper succession, the wrapper being drawn tightly about each stack even though there should be variations in the thicknesses of the stacks.

It is a further object of the invention to provide a wrapping machine wherein the material being wrapped constitutes a means for transmitting a thrust from a compressing plunger to a supporting table so that the stack of paper sheets can be used to effect a partial positioning of a wrapper therearound and these sheets and the engaged portion of the wrapper can be maintained under any pressure until the wrapper has been completely closed about its contents and its ends sealed together.

A still further object is to provide a machine having members for tucking the opposed ends of the wrapper after the stack has been confined under pressure by the wrapper secured therearound under pressure, these tucking operations being succeeded by folding operations by which the ends of the package are closed and then sealed prior to delivery of the completed package from the machine.

Another object is to provide an automatic machine which operates in proper succession, mechanisms for positioning a stack of paper at a point of starting, directing it onto a wrapper, placing the stack and wrapper under compression, folding the wrapper about the stack of paper while it is held under compression, sealing together the ends of the folded wrapper to maintain the contents under compression, tucking in and folding the ends of the wrapper, sealing said ends, and delivering the package in its completed form to the operator at said point of starting where another wrapper can be placed in position to receive another stack of loose paper sheets, and then, as all of the parts are reset automatically, the cycle of operations may be repeated.

Another object is to provide an automatic wrapping machine in which each mechanism employed for carrying out one step of the operations acts as a means for starting the mechanism which performs the next step of the wrapping operations so that each operation is thus dependent upon the completion of the next preceding operation.

A further object is to provide a machine which can be adjusted within wide limits for wrapping paper stacks of different sizes.

With the foregoing and other objects in view

which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings

Figure 1 is an elevation of the front or loading side of the machine.

Figure 2 is an elevation of the loading end of the machine, remote parts being removed.

Figure 3 is a central, vertical, longitudinal section through the machine.

Figure 4 is a section on line IV—IV, Figure 2.

Figure 5 is a section on line V—V, Figure 1.

Figure 6 is a section on line VI—VI, Figure 1.

Figure 7 is a section on line VII—VII, Figure 1.

Figure 8 is a section on line VIII—VIII, Figure 1.

Figure 9 is a section on line IX—IX, Figure 1.

Figure 10 is a section on line X—X, Figure 1.

Figure 11 is a section on line XI—XI, Figure 1.

Figure 12 is a section on line XII—XII, Figure 1.

Figure 13 is a plan view of the air supply and exhaust connections for the solenoid-controlled valves.

Figure 14 is a section, shown more or less in diagram, illustrating the first step in the operation of wrapping a stack of sheet paper.

Figure 15 is a similar view showing the next step.

Figure 16 is a view showing the third step.

Figure 17 is a view similar to Figure 16, showing the positions of the parts immediately prior to the sealing of the wrapper around the stack.

Figure 18 illustrates the next step of the wrapping operation.

Figure 19 is an elevation of the stack and adjacent parts following the tucking operation.

Figure 20 is a similar view showing the package following the operation of turning down the upper projecting portions of the wrapper.

Figure 21 shows the application of glue to the remaining projecting portion of the wrapper.

Figure 22 is an end elevation of the partly sealed package showing one of the positions of the folds while being turned by a turning shoe.

Figure 23 is a similar view showing the package completely sealed and ready to be elevated into delivery position.

Figure 24 is a view in diagram illustrating the controls of one-half of the machine.

Figure 24ª is a similar view showing the other half of the machine, the electrical connections of the apparatus being shown by heavy lines in Figures 24, 24ª and succeeding figures while the air lines are shown by light lines.

Figure 25 is a diagram showing the relative positions of the controls when the stack of paper is being advanced in the machine toward the position shown in Figure 14, it being understood that only those parts of the controls have been illustrated which are essential to this step of the operation.

Figure 26 is a view of the control apparatus in the positions thereof assumed when the parts are in the positions shown in Figure 14.

Figure 27 shows in diagram the controls in the proper positions during the wrapping step illustrated in Figure 15.

Figure 28 is a similar view illustrating the step of lifting the top plunger from the stack of paper after the stack has been brought to the position shown in Figure 15.

Figure 29 is a view similar to Figure 28 showing that portion of the apparatus functioning during the wrapping step illustrated in Figure 16.

Figure 30 is a similar view showing that portion of the apparatus functioning during the first stage of the step illustrated in Figure 17.

Figure 31 is a similar view showing that portion of the apparatus functioning during the wrapping step illustrated in Figure 18.

Figure 32 is a similar view showing the functioning part during the transfer of the package from the position shown in Figure 18 to the position shown in Figure 19.

Figure 33 is a similar view in diagram showing the functioning parts during the first portion of the lateral transfer of the partially wrapped package, as shown in Figure 19.

Figure 34 is a similar view showing the control apparatus functioning after the package has been transferred to the position shown in Figure 23.

Figure 35 shows the control apparatus ready to repeat the cycle of operations with a new stack of material in position preparatory to being moved to the station shown in Figure 14.

Figure 36 is a plan view of that portion of the apparatus used for guiding the package and for depressing the upper end folds while the package is being transferred between the wells, a package being showr entering the space beneath the fold-depressing elements.

Figure 37 is a side elevation of the structure shown in Figure 36.

Figure 38 is a bottom perspective view of one of the folding elements shown in Figures 36 and 37.

Figure 39 is a top plan view of that portion of the apparatus used for guiding the package and pressing the bottom end folds upwardly while the package is being moved between the wells.

Figure 40 is a side elevation of the structure shown in Figure 39.

The frame of this machine can be of any suitable size and construction and has been indicated generally at 1. Adjacent to the feed end of the table, which is the end illustrated in Figure 2 and at the right of Figures 1 and 3, there is a transverse table 2 which leads to one side of the upper end or inlet of a well 3. Standards 4 extend from the frame 1 at opposite sides of the well and support a cylinder 5 in which a piston 6 is mounted for reciprocation. A plunger 7 extends downwardly from this piston and below the cylinder, the lower end of this plunger being connected to a plunger head 8 which, under normal conditions, is supported above the level of the table 2 and directly over the well, as shown for example in Figure 3. This head is proportioned to move downwardly into the well so as to force thereinto any material which may be supported in the path thereof.

At that side of the well remote from the table 2 there is located a stop plate or abutment 9 which is supported close to the path of the head 8 and substantially in line with one side of the well. This abutment 9 has a deflector 10 extending from the lower edge thereof, the same being in the form of a plate inclined upwardly away from the well.

Deflecting plate 10 overlies a cross-bar 11 fixedly mounted between the sides of the frame 1 and is provided with a platen 12 which extends

under the deflecting plate 10 but is spaced therefrom to provide a transverse gap or throat 13 through which a web of paper can travel. The platen 12 has a fixed shearing edge 14 for cooperation with a knife as hereinafter explained and spaced from this edge and mounted on bar 11 is a stationary web-gripping plate 15.

Upper and lower feed rolls 16 and 17 are supported in the frame 1 adjacent to the plate 15 and also adjacent to one end of a guide plate 18 fixedly mounted in the frame. Adjacent to the other end of this guide plate is a guide roll 19 located under a spool 20 the shaft 21 of which is mounted on standards 22 extending upwardly from the frame. This shaft 21 is mounted in suitable bearings indicated generally at 23. A roll of paper has been indicated at P, this paper being used for wrapping purposes and obviously the length of the roll depends upon the size of the package to be wrapped. The web of paper from the roll is extended partly around the guide roll 19 and thence over guide plate 18 to the pass between the feed rolls 16 and 17 and from this point the said web W is extended across the plate 15 and platen 12.

The lower feed roll 17 which is preferably provided with a rubber face for gripping the web, can be driven by any suitable mechanism and rotates continuously. This roll, in the structure illustrated, is driven by a chain and sprocket mechanism indicated generally at 24 from a counter-shaft 25 in frame 1 and which countershaft in turn, is driven by the shaft 26 of a motor 27. This shaft has pulleys 28, as shown in Figure 9, one of which provides a belt 29 extending to a pulley 30 on the counter-shaft 25. Thus it will be noted that the lower feed roll 17 will be constantly rotated. The upper feed roll 16, however, is mounted in a tiltable frame 31 connected by a pitman 32 to a piston 33 carried by a cylinder 34. This tiltable frame is adapted, when moved in one direction, to lift the roll 16 relative to roll 17 so as thereby to release the grip on the web. Movement of the frame in the opposite direction will result in gripping the web so that it will be positively actuated by the rolls to feed toward the well. A valve for controlling the flow of air to the cylinder 34 whereby the actuation of roll 16 is affected, has been indicated generally at 35 in Figure 24, it being understood that this valve is of a type to be operated electrically through a lead 36 extending thereto.

*Web clamping, cutting and pasting mechanism*

Upstanding from the frame 1 adjacent to the ends of the bar 11, are standards 38 connected by a top member 39. These standards provide slots 40 in which a presser bar 41 is mounted to slide upwardly and downwardly, this bar being extended transversely of the machine and being connected, at its ends, to the rods 42 of pistons 43. The pistons are mounted to reciprocate within cylinders 44 connected to and depending from the top member 39. The presser bar 41 has a serrated cutting blade 45 secured along the lower edge portion thereof and projecting below the presser bar where it can work between plate 12 and plate 15.

Located between bar 41 and plate 15 is an elongated web-pressing foot 46 in the form of a bar having pins 47 extending upwardly therefrom and slidable within integral guides 48 carried by the top of the presser bar 41. These pins 47 carry springs 49 which are interposed between the top of bar 41 and the top of the foot 46 so as to exert a yielding downward pressure against said foot. Downward movement of foot 46 and its pins 47 is limited by collars 50 on the pins 47.

Located above the platen 12 is an elongated mucilage applying foot 51 which is movable between the blade 45 and the deflecting plate 10 and has upwardly extending pins 52 mounted to slide in guides 53 upstanding from the top of bar 41. Collars 54 similar to the collars 50 serve to limit the downward movement of this foot 51 and springs 55 which are mounted on the pins between foot 51 and the top of bar 41 serve to press yieldingly on the foot.

The top member 39 supported by standards 38 carries a lever 56 which, as shown in Figure 9, has a belt tightener 57 on one end while its other end is connected to member 39 by a tension spring 58. A guide pulley 59 is supported beyond one side of the machine by brackets 60 and another guide pulley 61 is supported above a container 62 which is located at the opposite side of the machine. An endless belt 63 is mounted on the pulleys 57, 59 and 61 and extends transversely of the machine between the presser foot 51 and the platen 12, this belt being normally spaced from the platen so as to be out of contact with the paper web W. Container 62 is adapted to hold a liquid adhesive and within this container is a roll 64 partly submerged in the liquid and contacting with the belt 63. Thus as the belt travels in the direction indicated by the arrow in Figure 9, an adhesive picked up by the roll 64 which is rotated by the belt, will be applied to the lower surface of the belt and thus carried into position above the platen 12 and the paper web thereon.

Pulley 61 can be driven in any suitable manner, as by means of a belt and pulley drive indicated generally at 66 and which, in turn, receives motion from a shaft 67. This shaft has a gear 68 receiving motion through a gear 69 from a shaft 25' extending transversely of the frame 1.

Obviously the belt is driven continuously by means of the mechanism described and as it is driven, air is admitted to or withdrawn from the pistons 44 with the result that the presser bar 41 is pushed downwardly and pulled upwardly at predetermined intervals. Every time this bar is thrust downwardly, presser foot 46 comes in contact with the web thereunder and clamps it tightly, the springs 49 contracting during further downward movement of the presser bar 41. The downward movement of the presser bar 41 also causes the serrated edge of the blade 45 to cut downwardly through the web along the cutting edge 14 of the platen 12 and at the same time the foot 51 presses that portion of the belt thereunder downwardly so that the adhesive on the lower surface of the engaged portion of the belt will thus be pressed onto the top surface of the web W at one side of the transverse cut which has been made in the web by the plate. During this period of operation the rolls 16 has been shifted out of contact with the web so that the web W is not being fed toward the well. As soon as the holding, cutting and glue-affixing operation has been completed, however, the bar 41 and the parts carried thereby will move upwardly away from the web, roll 16 will move into web-engaging position, and feeding of the web toward the well will then continue until a predetermined length has been fed into position whereupon the fore-

going operation will be repeated. At this time it might be stated that the movement of the web is sufficient to project the free end thereof across the well 3 where it will pass under the table 2 as shown particularly in Figure 14.

*Stacking-feeding mechanism*

The feed table 2 which extends toward the well 3 supports an upstanding plate 70 constituting the head of a plunger 71 which extends from a piston 72 mounted for reciprocation within a cylinder 73. This head 70 is adapted to reciprocate on the table 2 toward and from the well and is of sufficient height to engage and extend above the stack of paper to be wrapped. An arm 74 extends upwardly from the head 70 and plunger 71 and has a rod 75 fixedly secured thereto and extending over a delivery table 76 which is carried by frame 1 and extends over the cylinder 73. This delivery table 76 terminates at a delivery well 77 within the end portion of the machine and rod 75 carries a drag plate 78 which normally is located adjacent to the outer end wall of frame 1 in line with one wall of the well 77. However, when the feed head 70 moves away from the position shown in Figure 3 to the position shown, for example, in Figure 14, this drag head or plate 78 will move across the top of the well so that any material in the path thereof will thus be pushed onto the delivery table 76.

*Package forming apparatus*

A package supporting table 79 is carried by a plunger 80 having a piston 81 adapted to reciprocate within a cylinder 82 located beneath the well 3. This movable table 79 is adapted to travel upwardly and downwardly within the well 3 and, during the first stage of operations, is positioned in the upper end of the well directly under the head 8 and substantially flush with the feed table 2. This position of the movable table has been indicated in Figure 14.

When the movable table 79 is in its elevated position, it serves to support that portion of the paper web W in the path of or overlying the table while the free end portion of the web, which had been slid over the table 79 as the table was ascending to its uppermost position, will be guided across said ascending table onto an inclined deflecting plate 83 carried by and extending upwardly from a slide 84. This slide is normally located at one side of the well 3 and beneath the table 2 and there is a sufficient clearance between the slide 84 and table 2 to allow the deflector 83 to move into and out of the well.

Although the deflectors 83 is mounted on the plate 84, these two parts are adapted to slide relative to each other. Deflecting plate 83 is connected to a piston 85 mounted for reciprocation within a cylinder 86 and a depending finger 87 or other projecting portion carried by the deflector 83, is adapted to work back and forth between shoulders 88 and 89 on slide 84. Thus when piston 85 is moved toward the well 3, the deflector 83 will first be actuated by moving into the well after which the projecting portion 87 carried by the deflector will engage shoulder 88 and force the slide 84 into position partly across the well.

Normally, however, and as shown in Figure 14, both the slide 84 and the deflector 83 are retracted from the well 3 and under table 2.

One wall of the well 3 terminates at the lower level of the slide 84 as shown at 90 in Figure 15 and the opposite wall 91 is similarly located. This latter wall, however, has a stop plate 92 mounted for up and down sliding movement thereon, there being a lug or other projection 93 extending from the stop plate to a slot or other guiding means 94 in wall 91. By means of one or more springs 95 bearing against the projection 93, plate 92 is held normally elevated as shown in Figure 15.

A cross rod 96 is mounted to slide back and forth within slot 97 or other suitable guideways provided at the sides of the machine and this rod carries a lever 98 which is fulcrumed between its ends and has a clamping plate 99 secured to one end and normally located over the wall 91 but spaced therefrom. The other end of lever 98 is pivotally connected to a plunger including a piston 100 mounted for up and down movement within a cylinder 101. This cylinder is supported by and has a rocking connection with a yoke 102 carried by the rod 103 of a piston 104. This latter piston is mounted for reciprocation within a cylinder 105.

Obviously by directing fluid under pressure successively in cylinder 105 and cylinder 101, piston 104 will first be actuated to advance lever 98 longitudinally of the slot 97 until the sealing or pressure plate 99 projects into well 3 and overlies the top plate 92. Thereafter, when piston 100 is actuated the lever will be swung on its fulcrum to move the sealing plate 99 downwardly onto the stop plate 91 and the stack of material located in the well and in the path of the sealing plate as shown, for example, in Figure 18. This action of the sealing plate will of course result in a downward thrust on the stop plate 91 which therefore will not interfere with the descent of the sealing plate.

*Wrapper-applying operation*

It has already been explained how the web W is fed and cut by the mechanism provided for that purpose and a strip of adhesive placed on the severed portion of the web transversely thereof and close to the cut. As the web is being advanced toward the well 3 prior to the cutting operation, the movable table 79 is ascending and this table reaches a point adjacent to the top of the well when the moving web begins to feed over the well. Thus the ascending table 79 will serve to guide the moving web until one end thereof slides off of the table and through the space between said table 79 and the feed table 2 whereupon continued movement of the web preparatory to the severance thereof, will result in the advancing end of the web dropping onto the deflector 83 substantially to the position shown in Figure 14. By this time the table 79 has reached its uppermost position where the web thereon is substantially flush with the top surface of the table 2.

A stack of paper to be wrapped has already been placed on the table 2 in advance of the head 70 and by the time the table 79 has reached its uppermost position, this head 70 is brought into action so as to thrust the stack of paper S from the dotted line position shown in Figure 14 to the full line position shown in said figure. It is at or about this time that the web is severed and the mucilage applied. Immediately following the placing of the stack on the movable table 79, the plunger head or ram 8 moves downwardly against the stack and pressure is transmitted therefrom through the stack to the table 79 which, in turn, is thrust downwardly so that said table 79, ram 8

and the stack are thus brought to position between the walls 90 and 91 with the stack below the plane of movement of the slide 84.

As the stack is thrust downwardly in the manner explained, the end portions of the web will be brought to positions along opposite sides of the stack, the short end of the wrapper *w*, with the mucilage still applied to that face thereof nearest the stack, being left in an upstanding position as shown in Figure 15 while the long end of the wrapper is bent back over the deflector 83.

Following the foregoing action the deflector 83 is brought into play and will move toward well 3 so that the deflector will thus throw the long end of the wrapper *w* into position on the stack as shown in Figure 16. Immediately thereafter, the advancing deflector 83 causes the slide 84 to move into and partly across the well as shown in Figure 17, thus flattening out the long end of the wrapper and providing an abutment for the top of the stack as hereinafter explained.

Immediately following the foregoing operation the piston 104 is actuated and this will result in moving the raised sealing plate into position in the well but under the deflector 82. During this movement the sealing plate 99 will come against the short end of the wrapper *w* and push it over from the position shown in Figure 17 and this movement will be followed by a downward pressure of the gummed surface of the short end of the wrapper onto the other end of the wrapper lapped thereby due to the fact that following movement of the sealing plate into position under the deflector 83, the piston 100 will be shifted to swing the sealing plate downwardly. This sealing plate thus will be brought to the position shown in Figure 18 and during its descent it will push the stop plate 91 downwardly and at the same time tightly press the gummed surface of the short end of the wrapper onto that end of the wrapper positioned under the gummed surface.

A suitable heating element indicated generally at 106 and which can be in the nature of a resistance coil, will act to quickly heat and dry the adhesive during the operation of pressing the ends of the wrapper together.

It might be stated that immediately prior to the application of the short end of the wrapper to the long end thereof, the movable table 79 is thrust upwardly so that the back with the wrapper therearound will be tightly compressed, thereby insuring a tight package when the wrapping operation is completed.

*Tucking mechanism*

When the partial sealing of the wrapper is completed as already explained the free ends of the wrapper project beyond the corresponding ends of the surrounded stack S in the form of substantially rectangular tubes. These projecting tubular ends of the wrapper extend into the paths of opposed pairs of tucking heads 107 of suitable size and shape to meet the requirements. The tucking heads of each pair are connected to a cross-bar 108 and the ends of these cross-bars are slidably mounted within slots 109 in the sides of the frame. A centrally fulcrumed lever 110 is mounted on each side of the frame, one of these being shown in Figure 1 and pivotally connected to the upper arm of each lever is a pitman 111 connected to one end of that bar 108 beyond the far side of the well 3. Another pitman 112 is pivotally connected to the lower end of each lever 110 and is attached to one end of the bar 108 nearest the lever. Thus when the levers 110 and the shaft 113 to which they are secured, are moved in one direction, the bars 108 will be drawn toward each other whereas when the motion of the shaft is reversed, these bars will be moved apart.

The operation of the parts is so timed that immediately following the completion of the sealing together of the two ends of the wrapper *w*, the bars 108 will be moved toward each other and cause the tucking heads 107 to come against opposed sides of the respective angular tubular projecting portions of the wrapper. Thus these portions will be pressed inwardly against the respective ends of the stack, as shown in Figures 18 and 19, leaving triangular folds at the upper and lower corners of the wrapper. The inturned tucks of the wrapper have been indicated at *a* and the upper and lower folds have been indicated at *b* and *c* respectively.

The tucking operation just described can occur while the sealing plate 99 is in the position shown in Figure 18 and during or before the withdrawal of the tucking heads which will take place when the movement of shaft 113 is reversed, the sealing plate 99 will be retracted to its initial position by reversal of the movement of piston 104 and by the release of pressure from under piston 100 whereby one or more springs 114 can be brought into play to tilt lever 98 back to its normal position as shown in Figure 3. These springs can be located at any point found suitable for that purpose.

*Transfer mechanism*

Following the initial tucking operation already described the table 79, with the partly completed package thereon, is lowered to the lower end or outlet of the well 3 and into alinement with a transfer table 115 which extends toward the well 77 where a delivering ram is located. The head 116 of the delivering ram is normally flush with table 115 and is supported by a rod 117 extending from a piston 118. This piston is mounted to slide upwardly and downwardly within a cylinder 119.

Table 115, as shown particularly in Figure 6 is made up of a central, longitudinal strip 120 interposed between side strips 121 and 122. These strips have depending brackets 123 mounted on adjusting screws 124 which are supported in the sides of the frame 1 and have oppositely pitched threads engaged by the brackets of the respective strips. Thus when these screws are turned in one direction the brackets and their strips will be moved apart but when they are turned in the opposite direction, the said strips will be moved toward each other. Actuation of these screws can be effected by any suitable means such as a crank arm or the like, not shown, to be mounted on the angular end 125 of the screw.

Brackets 126 connected to the outer sides of the respective strips 121 and 122, carry posts 127 which, in turn, support parallel guide strips 128 adapted to overlie the package during its movement along transfer table 115. Thus the package will be held firmly on the table while it is being slid therealong. These guide strips 128 also serve to support folding elements indicated generally at 129 located above that portion of table 115 nearest the well 3. These folding devices, as shown in detail in Figures 36 to 38 inclusive, are of the usual type employed for deflecting downwardly the upper folds of a wrapper. Each of these devices comprises an upturned de-

flecting end 129a and a laterally extended depressing shoe 129b the inner side of which is inclined to provide a deflecting surface 129c. The shoes 129b are spaced apart a distance substantially equal to the length of the partially wrapped stack S. As the material is moved away from the well 3 by plunger 146 its ends are engaged and guided by the portions 129a while the projecting flaps *b* are pressed downwardly by the faces 129c against the ends of the stack, thereby moving each fold from the position shown in Figures 36 and 37 to a lowered position as shown in Figure 40.

Portions of the strips 121 and 122 forming the table 115 are provided with longitudinal grooves or depressions 130 as shown in Figure 6 and secured to these strips adjacent to the grooves are brackets 131 providing bearings 132 for opposed alined shafts 133 carrying mucilage-applying wheels 134 located above and extending into the grooves 130. These shafts are adapted to be driven by chain and sprocket mechanism indicated generally at 135 in Figure 6, from a transverse shaft 136. An adhesive can be applied to the wheels 134 in any suitable manner, as from a container 134' opening downwardly thereonto, as shown in Figure 21.

Shaft 136 is driven by chain and sprocket mechanism 137 from a transverse shaft 138 and this latter shaft is driven through gears 139 and 140 from a shaft 141 having a pulley 142 receiving motion through a belt 143 from a pulley 144 on shaft 25.

Between the gumming wheels 134 and the well 77, the strips 121 and 122 are provided with devices for raising the folds *c* and pressing them against the downwardly extended folds *b*. Each of these devices consists of a block or casting 145 in the path of the laterally extended folds *c* and that portion nearest the advancing stack is curved upwardly and inwardly to provide a cam surface 145a which merges gradually from a horizontal plane to the vertical inner side wall 145b of the block. Thus as the stack advances toward well 77 after flaps *b* have been depressed and the gumming wheels have been passed the horizontally projecting flaps *c* will ride onto the cam surfaces 145a from the positions shown in Figure 39 and be lifted against depressed flaps *b*.

A plunger is located at one side of the lower end of the well 3 and includes a head 146 connected to the rod 147 of a piston 148 which is mounted to reciprocate within a cylinder 149 The head 146 of this transfer ram or plunger is normally flush with the wall 91 of the well and also positioned so that it can slide over the table 79 and onto the transfer table 115 when said table is in its lowermost position as shown in Figure 3.

*Operation of transfer mechanism*

When the partially wrapped package with the ends tucked in is brought to its lowermost position by the descent of table 79 to the level of table 115, said package is brought into position in front of the transfer ram and this ram is then promptly actuated so that its head 146 will push the package off of table 79 and onto table 115. Here the upper projecting folds *b* of the package will be pressed downwardly by the folding elements 129 after which the lower folds *c* are brought into position across the grooves or depressions 130 and beneath the gumming wheels 134. The operation of these wheels will result in the application of gum to the upper surfaces of the projecting folds *b* and as these folds pass from under the wheels 134 they will be engaged and lifted by the folding elements 145, thereby to press the gummed faces of the flaps *c* upwardly and inwardly against the folded flaps *b*. Thus the parts will assume the positions shown in Figure 23 and immediately following the completion of the folding operation, the ram pushes the completely sealed package onto the delivery ram 116. Said ram is then set in motion to raise the sealed package to the level of the delivery table 76 after which a new stack of paper, which has already been placed on the table 2 is shifted into position on web W and table 79 at the top of well 3 so as to start a new cycle of operation. The feeding of the new stack obviously will cause the drag head 78 to engage the sealed package and pull it off of the table or ram 116 and onto table 76 from which it can be removed by the operator.

It will be noted that the arrangement of the tables 2 and 76 is such that one person standing adjacent thereto can readily place a stack of unwrapped sheets on table 2 and thereafter remove a sealed package from the table 76.

As a means for rocking the shaft 113, an arm 150 is extended downwardly therefrom and, as shown in Figure 4, is connected to a plunger 151 having a piston 152 mounted to reciprocate within a cylinder 153.

Instead of providing each screw 124 with an angular end 125, only one of them can be so provided and, by means of chain and sprocket mechanism indicated at 154 in Figure 3, the two screws can be rotated simultaneously by actuating one of them.

*Control apparatus*

As will be apparent from the foregoing description all of the parts of this machine are designed to work in properly timed relation and for the purpose of effecting the successive movements it is designed to use air under pressure and electrically operated valves for controlling the flow of air to various cylinders, the different electric circuits being opened and closed by certain of the parts of the apparatus as they reach predetermined positions. The air lines and the various electric circuits have all been shown in Figures 24 and 24a. In these figures as well as in the succeeding figures, the various air lines have been indicated by light lines while the electric conductors have been indicated by heavy lines.

In Figures 24 and 24a different positions of the movable table 79 have been indicated by broken lines and full lines at 79a, 79b and 79c.

At 155 there has been shown an electrically operated air valve operatively connected at 156 to an operating element 157 which can be a solenoid. These parts are shown in detail in Figure 12. In the entire machine it has been found desirable to use nine sets of these solenoids and valves in addition to the ones indicated at 155 and 157. These sets include valve 158 and solenoid 159, valve 160 and solenoid 161, valve 162 and solenoid 163, valve 164 and solenoid 165, valve 166 and solenoid 167, valve 168 and solenoid 169, valve 170 and solenoid 171, valve 172 and solenoid 173 and valve 174 and solenoid 175. All of the solenoids are connected to one lead of a circuit as indicated at 176 and when each solenoid is energized it actuates the valve associated therewith to open the same.

It will be noted that a pipe line 177 extends

from the outlet of valve 155 to the lower end of cylinder 119 and to that end of cylinder 149 nearest the well 3. Another pipe 178 connects the other end of cylinder 119 to valve 155, it being understood that the valve is to open these pipes 177 and 178 successively by proper actuation of the solenoid. Normally the pipe 177 is open so that the transfer ram 176 is normally retracted and the delivering table or ram 116 is normally elevated.

A pipe 179 extends from valve 158 to the lower end of cylinder 82 and another pipe 180 extends from valve 158 to the lower end of each cylinder 44 of the web cutting and pasting mechanism.

A pipe 181 leads from valve 160 to the back end of cylinder 73 and another pipe line 182 extends from this valve 160 to the opposite end of cylinder 73.

From valve 162 is extended a pipe line 183 which extends to the upper end of cylinder 5, and from this main valve 162 extends another pipe line 184 which leads to the lower end of cylinder 5.

Extending from valve 164 is a pipe line 185 leading to one end of cylinder 86 and another pipe 186 leads to the other end of said cylinder 86.

From valve 166 extends a pipe line 187 leading to the upper end of cylinder 44 while another pipe line 188, extending from valve 166, connects with pipe 179 leading to the lower end of cylinder 82.

Valve 168 has a single pipe line 189 extending therefrom to the lower end of cylinder 101 whereby the adjacent end of lever 98 is thrust upwardly, it being understood that when valve 168 is reversed by means of its operating means 169, air will be exhausted from the cylinder 101 so that the spring or springs 114 can restore piston 100 and lever 98 to their lower positions.

Valve 170 has a pipe 190 leading therefrom to the back end of cylinder 105 and another pipe line 191 leads from valve 170 to the other end of said cylinder 105.

From valve 172 extends a pipe line 192 which leads to one end of the cylinder 153, and another pipe line 193 extends from this valve 172 to the other end of cylinder 153.

From valve 174 is extended a pipe line 194 which leads to the upper end of the top of cylinder 82.

It is to be understood that air under proper pressure is to be supplied to the various valves in any manner desired. A supply pipe for this purpose has been indicated at 195 in Figures 24 and 24a.

For the purpose of controlling the operation of the valves in properly timed relation, it is essential that suitable circuit closers be located at different points in the apparatus whereby the operations of the mechanism will be interdependent or interlocking. These include, for example, a relay $R^3$ comprising a fixed contact 196 electrically connected to a magnet 197 which, when energized, is adapted to pull a lever 198 which carries a grounded contact 199. When the contact 199 is thus shifted and engages a stationary contact 200, the parts are locked together by the armature 201 of a magnet 202. Magnet 202 is electrically connected to a movable contact 203 carried by the member 31 of the web-release mechanism, it being understood that when contact 203 is shifted by the operation of stopping the movement of the paper, it comes against a grounded contact 204 in the path thereof.

Magnet 202 is also electrically connected to a relay $R^4$ including the magnet 205 of the locking armature 206 which is adapted to engage and hold down a lever 207 after it has been shifted by an energized magnet 208. Lever 207 carries a grounded contact 209 which, when shifted, is adapted to come against a contact 210 electrically connected as at 211 to the operating means 175 of valve 174. The magnet 208 is electrically connected, as at 212 to a stationary contact 213 located where it will be constantly engaged by a grounded contact 214 carried by the transfer ram 146, the contacts coming together when this ram reaches the end of its delivering movement and at the time the shifted package arrives above the lifting ram 116.

Contact 213 is also electrically connected to a relay $R^6$ including a magnet 215 which, when energized, attracts an armature 216 carrying a grounded contact 217. Lever 216 is adapted to be locked in shifted position by a latching armature 218.

When contact 217 is shifted by lever 216 when magnet 215 is energized, it engages a fixed contact 219 which is electrically connected, as at 220, to a stationary contact 221 adjacent to the other limit of movement of the transfer head 146.

An electrical connection 222 is provided between contact 221 and an electric magnet 223 of a relay $R^5$ and which is so positioned that, when energized, it will attract an armature 224 carrying a grounded contact 225. A shifted contact 225 will engage a fixed contact 226 connected to the operating means 157 of valve 155. When the lever 224 is shifted by the energized magnet 223 it will be held by a latching armature 227 with which cooperates an electromagnet 228 electrically connected, as at 229, to a fixed contact 230 located at the lower limit of movement of the table 79 when in its lowest position indicated at $79^a$. This table carries a grounded contact 231 which will engage contact 230 when the table is in its lowest position.

A shiftable contact 232 cooperates with contact 196 but is normally spaced therefrom. This contact is located where it will be shifted by the descending ram 8 so as to engage contact 196. Contact 232 is electrically connected, as at 233 to a stationary contact 234. A grounded contact 235 is carried by an armature 236 and normally engages the same. This armature is adapted to be shifted by an electromagnet 237 of a relay $R^1$ when the same is energized and a latching armature 238 serves to hold armature 236 in shifted position. Another grounded contact 239 is shifted ried by armature 236 so that when the armature is shifted by the energized magnet 237, the contact 239 will engage a contact 240. Latching armature 238 has an electromagnet 241 which is electrically connected as at 242 with a fixed contact 243 located where it will be engaged by contact 244 on ram 8, when said ram reaches position $8^a$.

Contact 240 is electrically connected, as at 245, to an electromagnet 246 adapted, when energized, to release the latching armature 218 from lever 216. This contact 240 is also electrically connected to the control means 163 of valve 162.

Electromagnet 237 is electrically connected, as at 246', to a fixed contact 247 adapted to be engaged by a shiftable contact 248 operable by plunger 70. This contact 248 is electrically connected to a contact 249 which, in turn, is adapted

to be engaged by a movable grounded contact 250 carried by an armature 251 which, when shifted out of normal position, will be engaged and held by a latching armature 252 of a relay $R^2$ with which cooperates an electromagnet 253. This electromagnet is electrically connected, as at 254 with the controlling means 165 of valve 164 and 167 of valve 166.

Another contact 255 is electrically connected, as at 256, to a contact 257 positioned for engagement by a grounded contact 258 on the table 79 when said table is in the position indicated at $79^c$ in Figure 24. A contact 256' is positioned for engagement with contact 255 and is electrically connected at 257' to the control means 161 of valve 160.

The electromagnet 259 of armature 251 is electrically connected, as at 260, to a contact 261 located where it will be engaged by a grounded contact 262 on the feed plunger 70 when said plunger reaches its advanced position at one side of the well 3, as shown by broken lines in Figure $24^a$.

Contact 200 is electrically connected, as at 263, to a fixed contact 264 located at a point where it will be engaged by a contact 265 movable with the table 79 when said table reaches the position indicated at $79^b$ in Figure 24 and this latter contact, 265, is electrically connected as at 266, to the controlling solenoid 171 of valve 170.

The sealing lever 98, which is mounted for reciprocation, as well as oscillation, carries a contact 267 which is adapted, when said lever is advanced to its extreme position nearest the well 3, to engage a contact 268 electrically connected to contact 264 and to the controlling solenoid 165 and 167 of the valves 164 and 166 respectively. This has been shown clearly in Figure 24.

Contact 267 is electrically connected, as at 268', to the controlling solenoid 169 of valve 168.

A movable contact 269 is carried by the sealing lever 98 and is electrically connected, as at 270 to the controlling solenoid 173 of valve 172. Contact 269 is adapted, when the sealing lever 98 is advanced toward well 3, to move into engagement with a contact 271 when the sealing plate on lever 98 is brought downwardly on the package being wrapped. This contact 271 is electrically connected, as at 272 to a contact 273 carried by the plate 84 when said plate is advanced into position within the well 3 as indicated by broken lines in Figure $24^a$.

Another contact 274 is carried by plate 84 and is connected to the lead 36 extending to the controlling mechanism 35 of the cylinder or roll 16.

Located in the path of contacts 273 and 274 where they will be engaged thereby when plate 24 is advanced to its extreme position within well 3, are contacts 275 electrically connected, as at 276 to contact 214 and also to the controlling solenoid 159 of the valve 158.

In Figure $24^a$ the lines for supplying current to this machine have been indicated diagrammatically at 277 and 278, these being controlled by a master switch M. The leads 176 extending to the controlling solenoids of the valves, can be connected in parallel to one of the conductors, 277 while the leads 279 extending to the various electromagnets, other than the valve controls, can be connected in parallel to the other main conductor, 278. The motor 27 for driving the mechanical parts of the machine is also controlled by master switch M.

In addition to the air-supply pipe or manifold 195 which leads to the several valves 155, 158, 160, 162, 164, 166, 168, 170, 172 and 174, there is provided an exhaust manifold 280 also in communication with these valves and when all of the mechanical parts of the apparatus are positioned as illustrated in diagram in Figures 24 and $24^a$, the several valves are positioned so that air will flow thereto and therefrom in the direction indicated by the arrows in said figures.

The positions of the mechanical parts illustrated in said Figures 24 and $24^a$ are as follows:

The table 79 is in elevated position as shown at $79^c$, ram 8 is in its raised position, sealing lever 98 is retracted and raised, ram 146 is retracted, feeding plunger or ram 70 is retracted, plate 84 is retracted, and the elevating ram 116 is in its lowermost position.

*Operation*

In Figures 14 to 23 inclusive the progress of a stack of paper while passing through the several stages of wrapping, has been illustrated from the initial or starting point, to the point of delivery. The several positons of the stack have been indicated in Figures 14 to 23 inclusive at A, B, C, D, E, F, G, H, I, J, K and L.

The stack of loose sheets to be wrapped and which has been indicated at S is placed on the feed table 2 in front of the feed plunger 70 and when the machine is set in motion by throwing master switch M, circuits are immediately established as indicated in Figure 25 with the result that air is caused to flow in the direction indicated by the arrows in said figure. In other words while table 79 is in its elevated position beneath a portion of a wrapper *w* supported across well 3 as indicated in Figure 14, the ram 8 is held up, the sealing and tucking means are held back, the transfer ram 146 is likewise held back while the delivering ram 116, which had already been loaded with a wrapped and sealed package, is directed upwardly toward the top of the well 77 in which it is mounted for reciprocation. At the same time air is directed back of feed plunger 70 so that it will be shifted toward well 3 and push the stack S into position on that portion of the wrapper supported by the table 79. This second position has been indicated at B in Figure 14.

As soon as plunger 70 reaches position B (as shown in Figure 14), it closes a circuit through contacts 262 and 261 thereby setting up circuits and air flows as indicated in Figure 26. This results in simultaneous elevation of the knife 45, with associated parts 46 and 51, release of upward pressure on table 79, application of downward pressure to the ram 8, and immediate reversal of pressure upon the feeding plunger 70, it being understood that the locked relay $R^1$ will maintain the circuit to the valve controlling means 163 to insure continued downward pressure of air on the ram 8, as shown in Figure 26.

The downward movement of ram 8 causes it to thrust through the stack S against the raised table 79 so that the stack will thus be started downwardly within the well 3 to an intermediate position indicated at C in Figure 15. Here the ram 8 brings contact 244 against contact 243 and forces contact 265 on table 79 into engagement with the contact 264. Thus circuits are established as shown in Figure 27 while the parts are in position C and air is caused to flow in the directions indicated by arrows in said figure.

When the parts are brought to the full line

positions shown in Figure 27 and which is position C, the flow of air to ram 8 is immediately reversed so that this ram is elevated to the dotted line position shown in said figure and from the dotted line position shown in Figure 15. This movement has brought the partially wrapped stack at a point in the well where it will be directly under the path of the plate 84 with the member 82 supporting one end portion of the wrapper while the other end is projecting slightly above the plate 92. This is position D.

When plate 84 advances as a result of the circuit established as shown in Figure 27, and as the ram 8 moves upwardly, it sets up circuits and air flows as indicated in Figure 28, these being established when the plate 84 completes its advance movement. As soon as the contacts 273 and 274 are brought against the contacts 275, as shown in Figure 28 and Figure 29, with plate 84 overlying the partially wrapped package and the long end of the wrapper thrown over onto the stack, as in Figures 16 and 17, the closing of the circuits at 273, 274 and 275 results in two quick operations. First, air under pressure is directed under table 79 to thrust it upwardly so as to compress the partly wrapped package kept against plate 84 and bring together the contacts 264 and 265. This results immediately in the electrical actuation of valve 164 and valve 166 with the result that the piston back of lever 98 is operated to move said lever toward well 3 as in Figure 29. This brings the contacts 267 and 268 together so that a circuit is closed to the electrically operated valve 163 with the result that lever 98 is swung downwardly to clamp the sealing plate 99 onto the package as shown in Figure 18. When the plate 99 was advanced it pushed against the upwardly projecting short end of the wrapper shown in Figure 17 so that, as plate 99 swings downwardly it will force this short end to position upon the end of the long flap. Thus the gummed surface will be brought into engagement with the surface on the opposed end. As the plate 99 contains heating elements 106, the action of sealing together the ends of the wrapper will also result in quickly drying the adhesive.

The operations of advancing plate 84, lifting table 79, advancing plate 77, and clamping together the ends of the wrapper are effected in very rapid succession. As soon as the plate 84 is brought to its advanced position, as shown in Figure 18, and while the other operations mentioned are taking place, the circuit to the electric operating means of valve 172 is closed so that the flow of air is directed back of the pistons of the tucker plate 107. Consequently this added operation takes place, namely, the inward folding of the sides of the projecting tubular ends of the wrapper as shown at *a* and the formation of upper and lower triangular folds *b*. This is illustrated in Figure 18.

Simultaneously with the completion of the foregoing operations due to engagement of contacts 273 and 274 with contact 275, the solenoids operating the valves 164 and 166 are energized so as to reverse the positions of the valves 164 and 166 so that the flow of air to the pistons of plate 84 and tuckers 107 is instantly reversed, thereby causing the connections to be broken at contacts 273, 274 and 275.

As the downward movement of lever 98 was momentary only and said lever was immediately returned by its spring so as to break the electrical connection at contacts 269 and 271, the opening of the circuits by the retraction of plate 84 and the lifting of lever 98 results in reversal of air flows whereby table 79 is moved downwardly to position $79^a$, and as the circuit to the operating means 35 of the paper P is broken, said feed is set in operation to move paper toward the well. This shifting of the paper feed away from restrained position into active position brings the contact 203 against the contact 204, thereby closing the circuits to the relays $R^3$ and $R^4$ as shown in Figure 32 so as to break those circuits previously controlled thereby as in Figure 31.

The descent of table 79 brings the partially wrapped and sealed package to position in front of the restrained transfer plunger 146 and, as shown in Fig. 33, closes the circuit to the relay $R^5$ which is thereby released to break the circuit to the controlling means of valve 155. Consequently the flow of air through this valve is reversed so that the lifting ram 116 is brought to its lowermost position while the transfer ram 146 is advancing. As this ram moves forwardly from the position shown in Figure 33, it thrusts the partially wrapped package from the position shown in Figure 19 onto table 115, as shown in Figure 20 at which time the upper projecting flaps *b* press downwardly across the sides of the stack. The advancing package then arrives between the glue affixing wheels or rollers 134 which, as shown in Figure 21, pass over the lower flaps of the wrapper. Continued progress of the package along the table 115 results in the gummed lower flap being pressed upwardly against the depending upper flap as shown in Figure 22 and immediately thereafter the completely wrapped and sealed package is brought into position on the delivering ram 116 as shown in Figure 23.

When the ram reaches the limit of its advance movement, a circuit is closed between contacts 213 and 214 with the result that relay $R^6$, as shown in Figure 34, is reset and locked, relay $R^4$ is reset and locked and relay $R^5$ is released so as to break the circuit to the operating means of valve 155. Thus the flow of air to the rams 146 and 116 is reversed, ram 116 immediately moving upwardly carrying with it the package which has been sealed and bringing the package to the level of the delivery table 76 while ram 146 moves back to its initial position, as shown by broken lines in Fig. 34. As soon as the ram reaches this position the contacts 221 and 214 are brought together, thereby closing the circuit to relay $R^5$ to close and lock the circuit, and operating valve 158 so that air will be directed simultaneously under table 79 to elevate it and, by way of valve 166, to the top of the piston controlling the cutter, paper holder and mucilage-applying element. Thus the paper, which by this time, has been brought to well 3, will be engaged and supported by the elevated table 79. In the meantime a fresh stack of loose sheets of paper has been placed on the feed table and as the table 79 reaches its raised position where it is supporting the cut and gummed wrapper, the cycle of operations beginning with Figure 25 of the drawing and continuing through Figure 35 is repeated.

It will be noted that the various operations carried on by this machine are interdependent, each operation being dependent upon the completion of the next preceding operation. The various operations take place in rapid succession and the wrapped and sealed packages can thus be carried through the machine and delivered as rapidly as stacks of unwrapped paper can be

placed on the feed table preparatory to being pushed onto the wrapper as heretofore explained.

What is claimed is:

1. A wrapping and sealing machine including a structure having a well, a feed table, a movable table in the well, means for feeding a wrapper downwardly into and across the well, movable means below the feed table and beyond one side of the well for engagement by the advancing end of the wrapper to support said end below the feed table and a portion of the wrapper across the path of the movable table, and means for shifting the movable table against the wrapper to lift a portion thereof to position across the end of and substantially in line with the feed table and to support it in such position.

2. A wrapping and sealing machine including a structure having a well, a feed table, a movable table in the well, means for feeding a wrapper downwardly into and across the well, movable means below the feed table and beyond one side of the well for engagement by the advancing end of the wrapper and for supporting said end below the feed table and a portion of the wrapper across the path of the movable table, means for shifting the movable table against the wrapper to lift a portion thereof to position across the end of and substantially in line with the feed table and to support it in such position, and means operating in timed relation to the table for moving material to be wrapped from the feed table and onto the supported wrapper.

3. In a machine for wrapping sheets of paper, a structure having a feed table, a well, a supporting table mounted for up and down movement in the well, means for feeding a length of sheet wrapping material into and across the well and under the feed table, means operating in timed relation to said feeding means for elevating the table to support a portion of the sheet of wrapping material momentarily across the well, said tables cooperating to fold one end of the sheet downwardly into the well, and means operating while the movable table is momentarily in its elevated position, to move material to be wrapped off of the feed table and across the folded portion of the wrapping material onto that portion of said material on the movable table.

4. In a machine for wrapping sheets of paper, a structure having a feed table for holding material to be wrapped, a well, a supporting table mounted for up and down movement in the well, means for feeding a length of sheet wrapping material into and across the well and advancing one end thereof to position beneath the feed table, means operating in timed relation to said feeding means for elevating the table to fold downwardly the advanced end of the wrapping material and to support a portion of said wrapping material momentarily across the well, a plunger, means for operating the plunger while the movable table is momentarily in its elevated position, to move said material off of the feed table and over the fold onto that portion of the wrapping material on the movable table, a ram, and means for directing the ram onto the material supported by the wrapper, thereby to compress said material on the movable table and force it and the table into the well.

5. In a machine for wrapping a stack of paper sheets, a structure having a well, a feed table leading to one side thereof, means for feeding a wrapper across the well and under the feed table, a supporting table in the well, means for moving said supporting table upwardly into line with the feed table, thereby to fold one end of the wrapper downwardly and momentarily support the remainder of the wrapper across the well and substantially flush with the feed table, said last means also operating to move the table downwardly, and separate means operating in timed relation to the supporting table and while the wrapper is momentarily supported thereby, for gripping the wrapper and applying adhesive thereto.

6. In a machine for wrapping a stack of paper sheets, a structure having a well, a feed table leading to one side thereof, means for feeding a wrapper across the well and under the feed table, a reciprocating table in the well for momentarily supporting a portion of the web across the well and substantially flush with the feed table, said reciprocating table and feed table cooperating to bend down one end of the wrapper when the reciprocating table is moved to raised, wrapper-supporting position, a presser bar, means for depressing the bar while the wrapper is momentarily supported by the reciprocating table, and a yieldingly held presser foot carried by the bar positioned to clamp on the wrapper adjacent to one end while the other end is being bent.

7. In a machine for wrapping a stack of paper sheets, a structure having a well, a feed table leading to one side thereof, means for positioning a wrapper across the well and under the feed table, a reciprocating table in the well for momentarily supporting a portion of the wrapper across the well and substantially flush with the feed table said reciprocating and feed tables cooperating to bend down that portion of the wrapper beneath the feed table when the reciprocating table is in its raised, wrapper-supporting position, a presser bar, means for depressing the bar while the wrapper is momentarily supported across the well, a yieldingly supported presser foot carried by the bar and positioned for holding the wrapper adjacent to one end while the other end is bent downwardly, and an adhesive applicator carried by the bar for engaging the held wrapper.

8. In a machine for wrapping a stack of paper sheets, a structure having a well, a feed table leading to one side thereof, means for positioning a wrapper across the well with one end under the feed table, a reciprocating supporting table in the well for momentarily supporting a portion of the wrapper across the well and substantially flush with the feed table, said supporting and feed tables cooperating to bend down that end of the wrapper under the feed table, a presser bar, means for shifting said bar toward the wrapper while the wrapper is momentarily supported across the well, a yieldable element carried by the bar positioned and operating in timed relation with the supporting table to hold a portion of the wrapper during the bending of said end of the wrapper an endless belt having an upwardly yielding lower portion movable with the bar and substantially parallel with the clamped portion of the wrapper, and means for supplying an adhesive to the belt.

9. In a machine for wrapping a stack of paper sheets, a structure having a well, a feed table leading to one side thereof, means for positioning a wrapper across the well with one end under the feed table, a reciprocating supporting table in the well for momentarily supporting a

portion of the wrapper across the well and substantially flush with the feed table, said supporting and feed tables cooperating to bend down said end of the wrapper, guiding means adjacent to the well, a yieldingly supported presser bar mounted therein, means for shifting the bar toward the wrapper while momentarily supported across the well, means carried by the bar for holding the wrapper while said end is being bent, and an adhesive applicator carried by the bar, said applicator including an endless belt extended transversely of and above the wrapper, a yieldable foot carried by the bar and positioned above the lower portion of the belt, said foot constituting a depressing means for said portion of the belt, an adhesive container, means for operating the belt, means for guiding the belt under the foot, and means for transferring adhesive from the container to one surface of the belt.

10. In a machine for wrapping a stack of paper sheets, a structure having a well, a feed table leading to one side thereof, means for positioning a wrapper across the well with one end under the feed table, a reciprocating supporting table in the well for momentarily supporting a portion of the wrapper across the well and substantially flush with the feed table, said supporting and feed tables cooperating to bend down one end of the wrapper, a yieldingly supported presser bar above the wrapper, a yieldable wrapper clamping device carried by the bar, an endless belt, yielding means carried by the bar for depressing a portion of the belt for contact with the clamped wrapper, means for actuating the belt to effect a wiping contact with the clamped wrapper, and means for applying an adhesive to one surface of the belt.

11. In a wrapping machine a structure having a well, a supporting table mounted for up and down movement in the well, a ram above the table, means for directing a sheet of wrapping paper into the well and across the path of said table, means for elevating the table to support a portion of said sheet, a plunger positioned to direct a stack of sheet material onto the supported portion of the wrapper, means operating in timed relation with said table for advancing and retracting said plunger while the table is in its elevated position, and means controlled by the retraction of the plunger, for actuating the ram toward and against the material on the table.

12. In a wrapping machine a structure including a well having opposed walls, a supporting table mounted for up and down movement in the well, means operating in timed relation with the table for directing a sheet of wrapping paper onto said table and positioning it with opposed ends projecting over and beyond said walls, a ram above the table, a plunger mounted to advance and retract relative to the well, means for advancing the plunger to feed onto the supported sheet the material to be wrapped and for retracting the plunger, means controlled by the plunger for lowering the ram to compress the material on the table and thrust the table and material downwardly into the well, said walls cooperating with the descending material to bend the projecting ends of the wrapper upwardly at opposed sides of the material, a deflector, separate means controlled by the ram when lowered to a predetermined position for successively raising the ram and actuating the deflector to engage one free end of the wrapper and turn it onto the material on the table, and a slide shiftable by the deflector into position above and close to the overturned end of the wrapper and the top of the material to be wrapped.

13. In a wrapping machine, a structure having a well, a supporting table mounted for up and down movement therein, and constituting means for supporting the intermediate portion of a wrapper and a stack of material on said portion, a ram, means for forcing the ram toward the table to compress the stack and lower it and the table within the well, said well having walls for bending the ends of the wrapper upwardly beyond the stack as the table descends, a deflector, means controlled by the table for elevating the ram and shifting the deflector against one end portion of the wrapper to turn it onto the stack, a slide actuated by the deflector for movement to position in the well over and close to the stack and its overturned wrapper end, and means controlled by said movement of the slide for shifting the table to compress the stack and wrapper against the slide.

14. In a wrapping machine a structure having a well, a table therein constituting means for supporting a wrapper having a gummed end and a stack of sheet material centered on and spaced from all of the edges of the wrapper, said well having walls for supporting opposed ends of the wrapper in upwardly extended positions at and above the adjacent sides of the stack, a slide, means for moving the slide against one extended portion of the wrapper and over said portion and the stack to partly fold the wrapper, means controlled by said movement of the slide for elevating the table to compress the stack and wrapper, a pressure plate mounted for oscillation and reciprocation, and means controlled by said slide for actuating the plate to fold the other extended portion of the wrapper onto the stack and compress the end portions of the wrapper together in lapping relation.

15. In a wrapping machine a structure having a well, a table therein constituting means for supporting a wrapper having a gummed end and a stack of sheet material centered on and spaced from all of the edges of the wrapper, said well having walls for supporting opposed ends of the wrapper in upwardly extended positions at and above the adjacent sides of the stack, a slide, means for moving the slide against one extended portion of the wrapper and over said portion and the stack to partly fold the wrapper, means controlled by said movement of the slide for elevating the table to compress the stack and wrapper, a pressure plate mounted for oscillation and reciprocation, means controlled by said slide for actuating the plate to fold the other extended portion of the wrapper onto the stack and compress the end of the wrapper together in lapping relation, thereby to bind the stack and provide projecting tubular portions beyond the sides of the stack, opposed tucking devices, and means controlled by the clamping plate for shifting the tucking devices into and out of engagement with opposed sides of the tubular portions to fold said sides inwardly against the stack.

16. In a wrapping machine a structure having a well, a table therein constituting means for supporting a wrapper having a gummed end and a stack of sheet material centered on and spaced from all of the edges of the wrapper, said well having walls for supporting opposed ends of the wrapper in upwardly extended positions at and above the adjacent sides of the stack, a slide, means for moving the slide against one extended portion of the wrapper and over said

portion and the stack to partly fold the wrapper, means controlled by said movement of the slide for elevating the table to compress the stack and wrapper, a pressure plate, means controlled by said slide for actuating the plate to fold the other extended portion of the wrapper onto the stack and compress the end portions of the wrapper together in lapping relation, thereby to bind the stack and provide projecting tubular portions beyond the sides of the stack, opposed tucking devices, means controlled by the clamping plate for shifting the tucking devices into and out of engagement with opposed sides of the tubular portions to fold said sides inwardly against the stack, and separate means controlled by the retraction of the tucking devices from the folded tubular portions, for returning the slide and clamping plate to their initial positions and for lowering the table and its load.

17. In a machine for wrapping a stack of paper sheets, a movable table for supporting a wrapper with the stack thereon and spaced from the edges thereof, opposed means for supporting opposed ends of the wrapper in upwardly extended position, a slide, pneumatic means for moving the slide against one of said ends and over the stack to partly fold the wrapper, a clamping plate mounted for sliding and swinging movement, and pneumatic means for successively sliding the plate against the other end of the wrapper and over the stack and for swinging the plate to clamp said end onto the first named end, one of said ends being gummed.

18. In a machine for wrapping a stack of paper sheets, a movable table for supporting a wrapper with the stack thereon and spaced from the edges thereof, opposed means for supporting opposed ends of the wrapper in upwardly extended positions, a slide, means for moving the slide against one of said ends and over the stack to partly fold the wrapper, means for shifting the table to clamp the stack and folded portion of the wrapper against the slide, a clamping plate mounted for sliding and swinging movement, and means for successively sliding the plate against the other end of the wrapper and over the stack and for swinging the plate to clamp said end onto the first named end, one of said ends being gummed.

19. In a machine for wrapping a stack of paper sheets, a movable table for supporting a wrapper with the stack thereon and spaced from the edges thereof, opposed means for supporting opposed ends of the wrapper in upwardly extended positions, a slide, means for moving the slide against one of said ends and over the stack to partly fold the wrapper, means for shifting the table to clamp the stack and folded portion of the wrapper against the slide, a clamping plate mounted for sliding and swinging movement, and means for successively sliding the plate against the other end of the wrapper and over the stack and for swinging the plate to clamp said end onto the first named end, one of said ends being gummed, and a heating element carried by the wrapper engaging portion of the plate.

20. In a machine for wrapping a stack of paper sheets, a movable table for supporting a wrapper with the stack thereon and spaced from the edges thereof, opposed means for supporting opposed ends of the wrapper in upwardly extended positions, a yieldingly supported stop on one of said means and extending above the stack, a slide, means for moving the slide against one of said wrapper ends and over the stack to partly fold the wrapper onto the stack, a clamping plate mounted for sliding and swinging movement, means for sliding the plate against the other end of the wrapper and over the stack and the other end of the wrapper, and means for swinging said plate against the stop and wrapper to depress the stop and clamp the engaged end of the wrapper upon the other end of said wrapper, one of said ends having an adhesive.

21. In a machine for wrapping a stack of paper sheets, a movable table for supporting a wrapper and a stack of paper on and spaced from the edges of the wrapper, means for supporting the ends of the wrapper in upwardly extending positions above the stack, a deflector, means for shifting the deflector against one of said ends to turn it onto the stack, a slide, means operated by the deflector for moving the slide to position over and close to said end of the wrapper and the stack, and means operating in timed relation with the slide for shifting the table to compress the partly wrapped stack against the slide.

22. A wrapping and sealing machine including a structure having a well with a top inlet and a bottom outlet, a feed table leading to the inlet, means for directing a wrapper downwardly across the inlet and under the table, a supporting table mounted for upward movement in the well to lift a portion of the wrapper into position substantially flush with the feed table, said tables cooperating to bend downwardly that end of the wrapper beneath the feed table.

23. A wrapping and sealing machine including a structure having a well with a top inlet and a bottom outlet, a feed table leading to the inlet, means for directing a wrapper downwardly across the inlet and under the table, a supporting table mounted for upward movement in the well to lift a portion of the wrapper into position substantially flush with the feed table and for downward movement in the well to lower the wrapper to the outlet.

24. A wrapping and sealing machine including a structure having a well with a top inlet and a bottom outlet, a feed table leading to the inlet, means for directing a wrapper downwardly across the inlet and under the table, a supporting table in the well, means for moving the supporting table upwardly to lift the wrapper into position substantially flush with the feed table and for lowering the table to the outlet, and separate means adjacent to the inlet and outlet for respectively directing onto the raised wrapper a material to be wrapped and for removing the wrapper and material at the outlet.

25. A wrapping and sealing machine including a structure having a well with a top inlet and a bottom outlet, a feed table leading to the inlet, means for directing a wrapper downwardly across the inlet and under the table, a supporting table in the well, means for moving the supporting table upwardly to lift the wrapper into position substantially flush with the feed table and for lowering the table to the outlet, separate means adjacent to the inlet and outlet for respectively directing onto the raised wrapper a material to be wrapped and for removing the wrapper and material at the outlet, and means operating in the well between the inlet and outlet for folding the wrapper about said material.

26. A wrapping and sealing machine including a structure having a well with a top inlet and a bottom outlet, a feed table leading to the inlet, means for directing a wrapper downwardly across the inlet and under the table, a support-

ing table in the well, means for moving the supporting table upwardly to lift the wrapper into position substantially flush with the feed table and for lowering the table to the outlet, means adjacent to the inlet for directing onto the lifted portion of the wrapper the material to be wrapped, and means positioned for operation in the well between the inlet and outlet for folding the wrapper about said material.

27. A wrapping and sealing machine including a structure having a well with a top inlet and a bottom outlet, a feed table leading to the inlet, means for directing a wrapper downwardly across the inlet and under the table, a supporting table in the well, means for moving the supporting table upwardly to lift the wrapper into position substantially flush with the feed table and for lowering the table to the outlet, means adjacent to the inlet for directing onto the lifted portion of the wrapper the material to be wrapped, and separate means positioned for operation in the well between the inlet and outlet for successively folding the ends of the wrapper over said material to form a tube with projecting ends, and tucking in opposed portions of each of said ends.

28. A wrapping and sealing machine including a structure having a well with a top inlet and a bottom outlet, a feed table leading to the inlet, means for directing a wrapper downwardly across the inlet and under the table, a supporting table in the well, means for moving the supporting table upwardly to lift the wrapper into position substantially flush with the feed table and for lowering the table to the outlet, means adjacent to the inlet for directing onto the lifted portion of the wrapper the material to be wrapped, separate means positioned for operation in the well between the inlet and outlet for successively folding the ends of the wrapper over said material to form a tube with projecting ends, and tucking in opposed portions of each of said ends, means operating in timed relation with the supporting table for shifting the tucked and folded wrapper and the material therein from the outlet, and means in the path of the projecting ends of the shifting wrapper for folding the projecting portions of said ends into lapping relation to close the wrapper.

29. In a machine for wrapping sheets of paper, a structure having a feed table for holding material to be wrapped, a well, a supporting table mounted for up and down movement in the well, means for feeding a length of sheet wrapping material into and across the well and advancing one end thereof to position beneath the feed table, means operating in timed relation to said feeding means for elevating the table to fold downwardly the advanced end of the wrapping material and to support a portion of the wrapping material momentarily across the well, a plunger, means for operating the plunger while the movable table is momentarily in its elevated position, to move said material off of the feed table and over the fold onto that portion of the wrapping material on the movable table, a ram, means for directing the ram onto the material supported by the wrapper, thereby to compress said material on the movable table and force it and the table into the well, and means adjacent to the well and cooperating with the descending table and plunger to elevate the folded end above the supporting table.

30. In a wrapping machine a structure having a well, a supporting table mounted for up and down movement in the well, a ram above the table, means for directing a sheet of wrapping paper into the well and across the path of said table, means for elevating the table to support a portion of said sheet, a member positioned to direct a stack of sheet material onto the supported portion of the wrapper, means operating in timed relation with said table for operating said member to move the stack onto the table and then withdraw from the stack while the table is in its elevated position, and means operating in timed relation with the plunger, for actuating the ram toward and against the material on the table.

31. In a wrapping machine a structure having a well, a table therein constituting means for supporting a wrapper having a gummed end and a stack of sheet material centered on and spaced from all of the edges of the wrapper, said well having walls for supporting opposed ends of the wrapper in upwardly extended positions at and above the adjacent sides of the stack, a slide, means for moving the slide against one extended portion of the wrapper and over said portion and the stack to partly fold the wrapper, means set in motion by said movement of the slide for elevating the table, stack and wrapper, a pressure plate, and means set in motion by said slide for actuating the plate to fold the other extended portion of the wrapper onto the stack and compress the end portions of the wrapper together in lapping relation.

32. In a wrapping machine a structure having a well, a table therein constituting means for supporting a wrapper having a gummed end and a stack of sheet material centered on and spaced from all of the edges of the wrapper, said well having walls for supporting opposed ends of the wrapper in upwardly extended positions at end above the adjacent sides of the stack, a slide, means for moving the slide against one extended portion of the wrapper and over said portion and the stack to partly fold the wrapper, means set in motion by said movement of the slide for elevating the table, stack and wrapper, a pressure plate, means set in motion by the movement of said slide for actuating the plate to fold the other extended portion of the wrapper onto the stack and compress the end of the wrapper together in lapping relation, thereby to bind the stack and provide projecting tubular portions beyond the sides of the stack, opposed tucking devices, and means controlled by the clamping plate for shifting the tucking devices into engagement with opposed sides of the tubular portions to fold said sides inwardly against the stack.

33. In a machine for wrapping a stack of paper sheets, a movable table for supporting a wrapper with the stack thereon and spaced from the edges thereof, opposed means for supporting opposed ends of the wrapper in upwardly extended positions, a slide, means for moving the slide against one of said ends and over the stack to partly fold the wrapper, means for shifting the table to clamp the stack and folded portion of the wrapper against the slide, a clamping plate, and means for successively moving the plate against the other end of the wrapper and over the stack to clamp said end onto the first named end, one of said ends being gummed.

34. In a machine for wrapping a stack of paper sheets, a movable table for supporting a wrapper with the stack thereon and spaced from the edges thereof, opposed means for supporting opposed ends of the wrapper in upwardly extended

positions, a yieldingly supported stop on one of said means and extending above the stack, a slide, means for moving the slide against one of said wrapper ends and over the stack to partly fold the wrapper onto the stack, a clamping plate, means for moving the plate against the other end of the wrapper and over the stack and the other end of the wrapper, and means for moving said plate against the stop and wrapper to depress the stop and clamp the engaged end of the wrapper upon the other end of said wrapper, one of said ends having an adhesive.

35. In a wrapping machine a structure having opposed walls, a member mounted for reciprocation relative to the walls, means operating in timed relation with said member for directing a wrapper thereacross and positioning it with opposed ends projecting across and beyond said walls, a ram, a plunger mounted to advance and retreat relative to said member, means for advancing the plunger to feed to the wrapper the material to be wrapped and for retracting the plunger, means controlled by the plunger for actuating the ram to compress the material against said member and thrust the member and material in one direction, said walls cooperating with the moving material to bend the projecting ends of the wrapper at opposed sides of the material, a slide, and separate means controlled by the ram when moved to a predetermined position for successively returning the ram and actuating the slide to engage and fold one bent free end of the wrapper relative to the material to be wrapped.

36. In a wrapping machine, a structure having a well, a supporting table mounted for up and down movement therein, and constituting means for supporting the intermediate portion of a wrapper and a stack of material on said portion, a ram, means for forcing the ram toward the table to compress the stack and lower it and the table within the well, said well having walls for bending the ends of the wrapper upwardly beyond the stack as the table descends, a slide, means controlled by the table for elevating the ram and shifting the slide against one end portion of the wrapper to position in the well over and close to the stack and said wrapper end, and means set in motion by said movement of the slide for shifting the table to move the stack and wrapper against the slide.

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