I. FOREMAN.

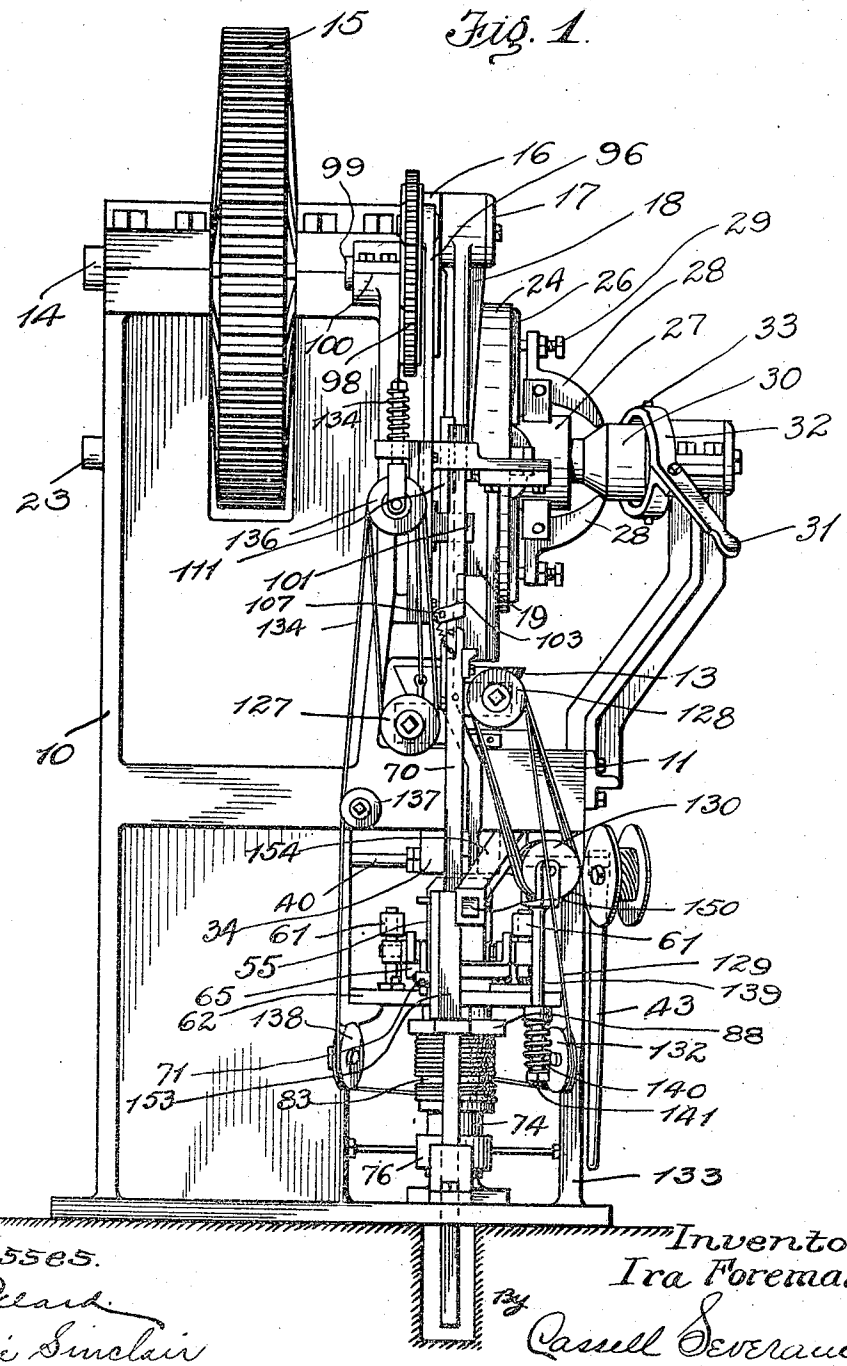
MATERIAL COMPRESSING MACHINE.

APPLICATION FILED MAY 10, 1915. RENEWED MAY 17, 1917.

1,250,702. Patented Dec. 18, 1917.

6 SHEETS—SHEET 1.

Fig. 1.



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MATERIAL COMPRESSING MACHINE.

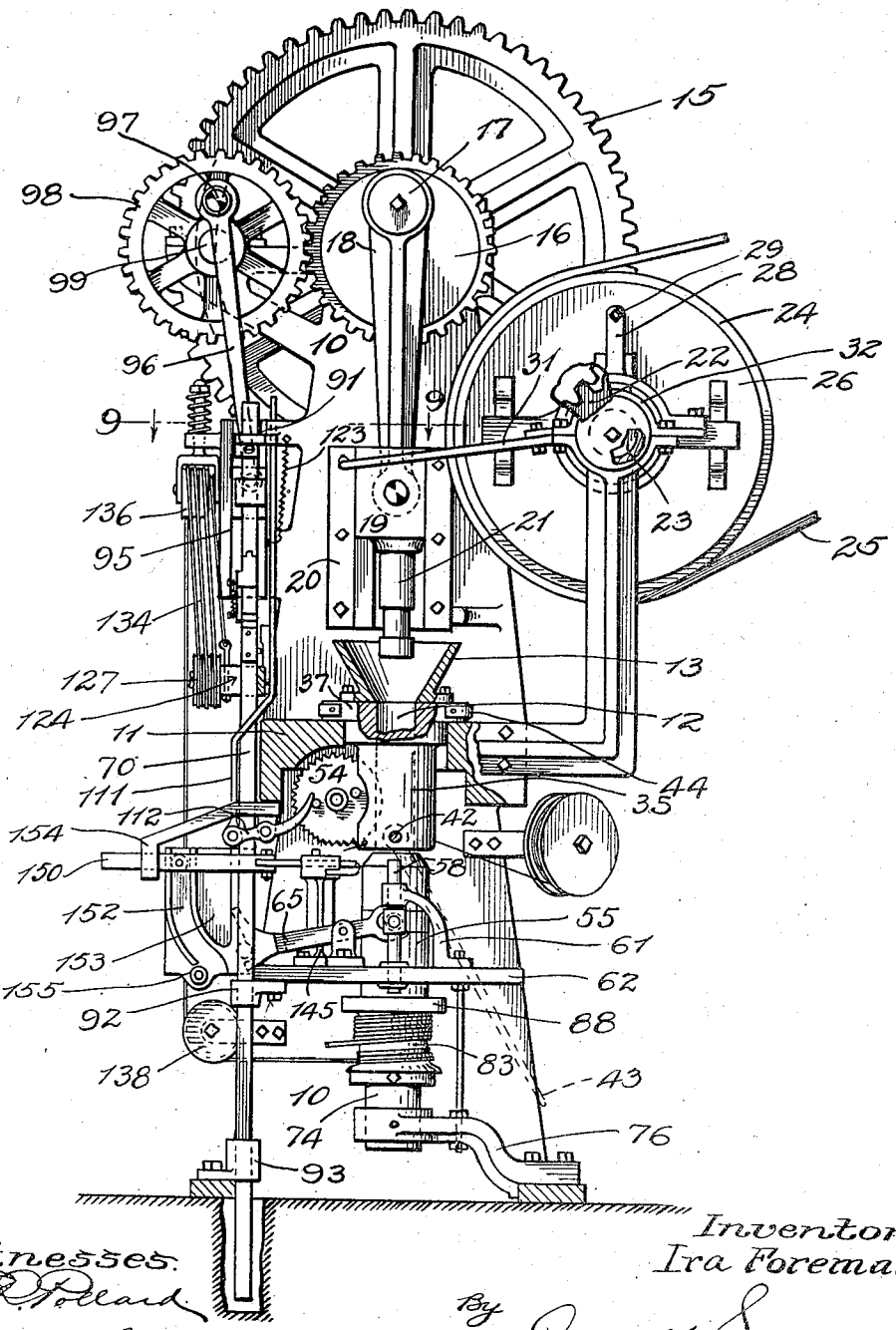
APPLICATION FILED MAY 10, 1915. RENEWED MAY 17, 1917.

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6 SHEETS—SHEET 2.

Fig. 2.



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6 SHEETS—SHEET 3.

Fig. 3.

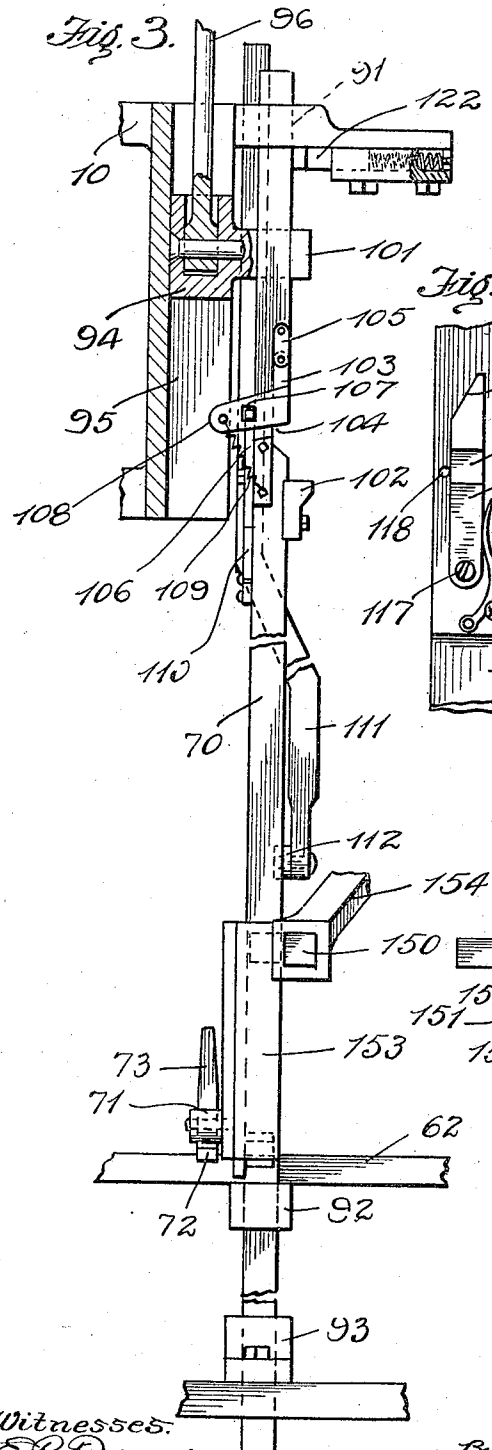


Fig. 19.

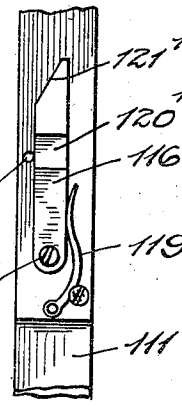
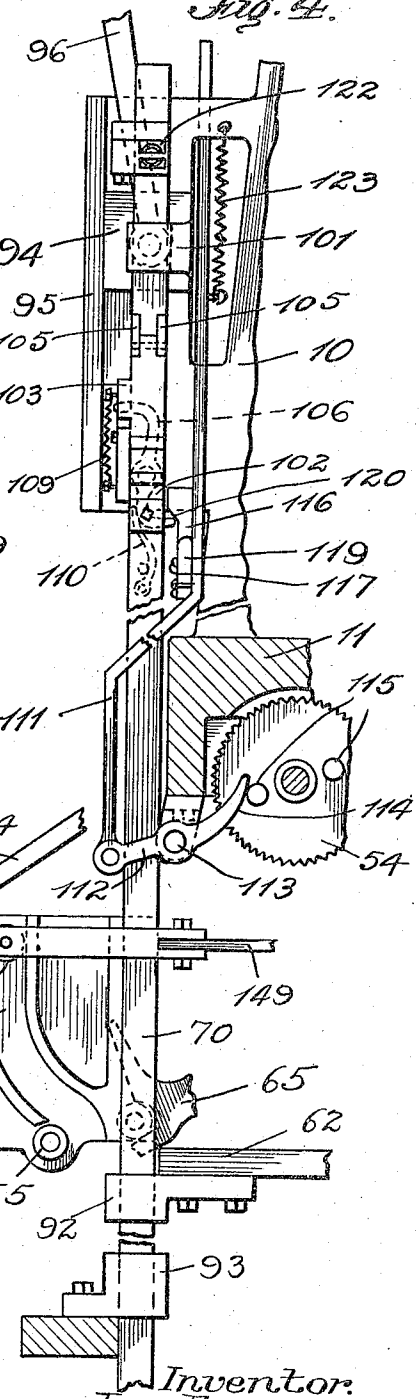


Fig. 4.



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6 SHEETS—SHEET 4.

Fig. 5.

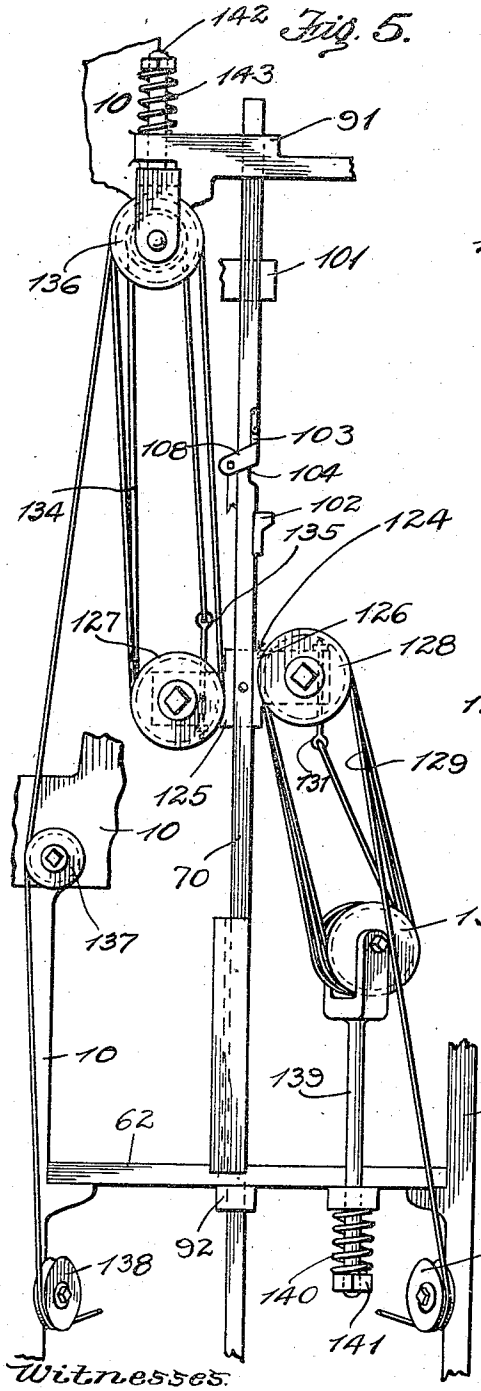


Fig. 6.

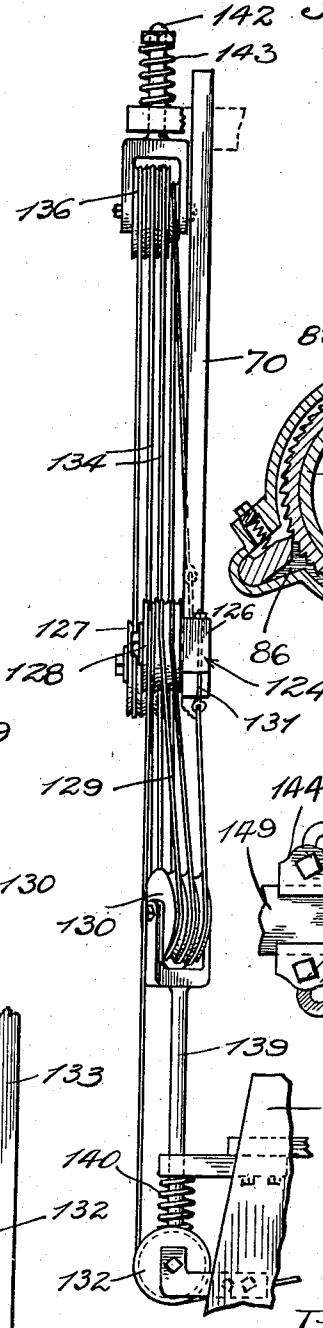


Fig. 7.

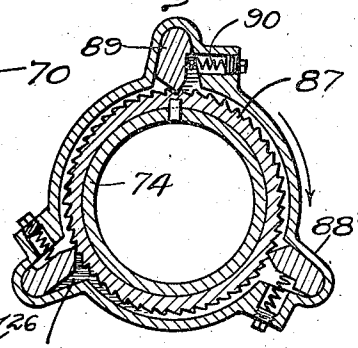
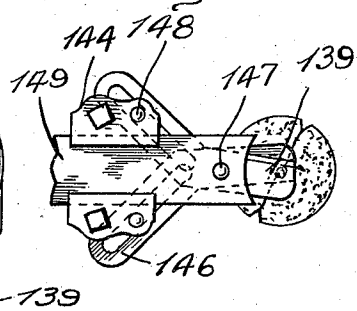


Fig. 8.



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6 SHEETS—SHEET 5.

Fig. 9.

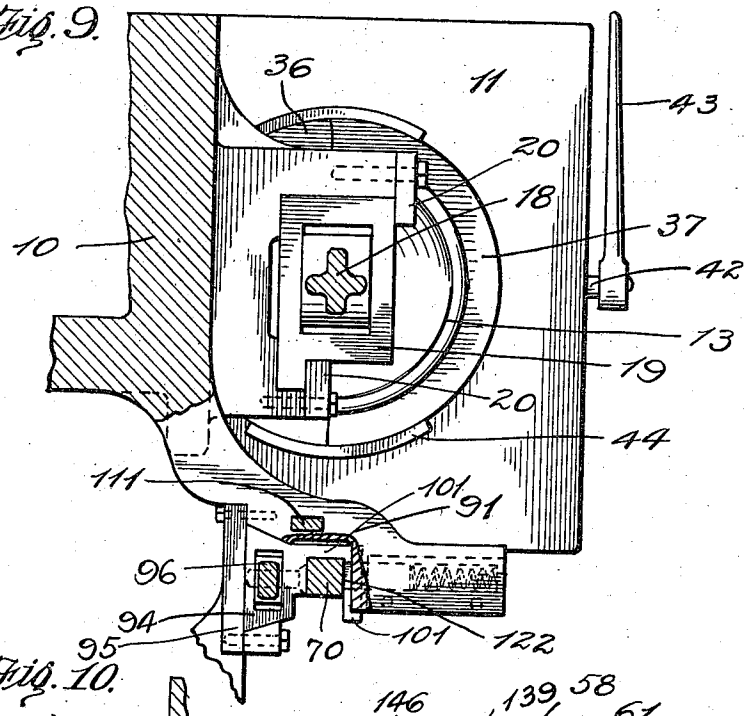


Fig. 10.

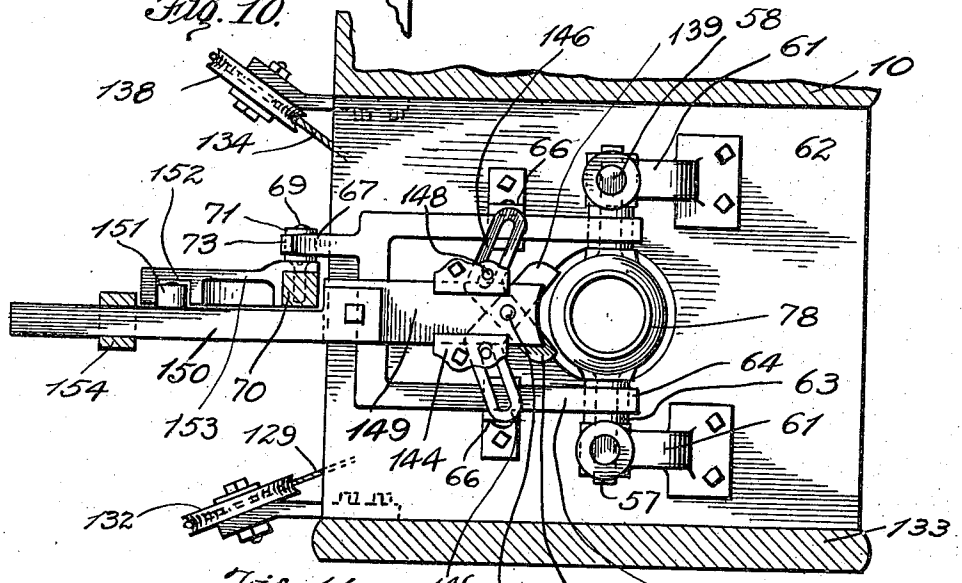
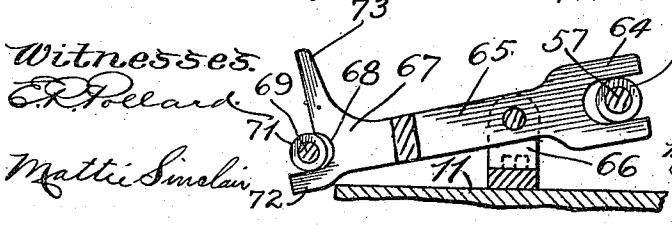


Fig. 11.



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MATERIAL COMPRESSING MACHINE.

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Fig. 12.

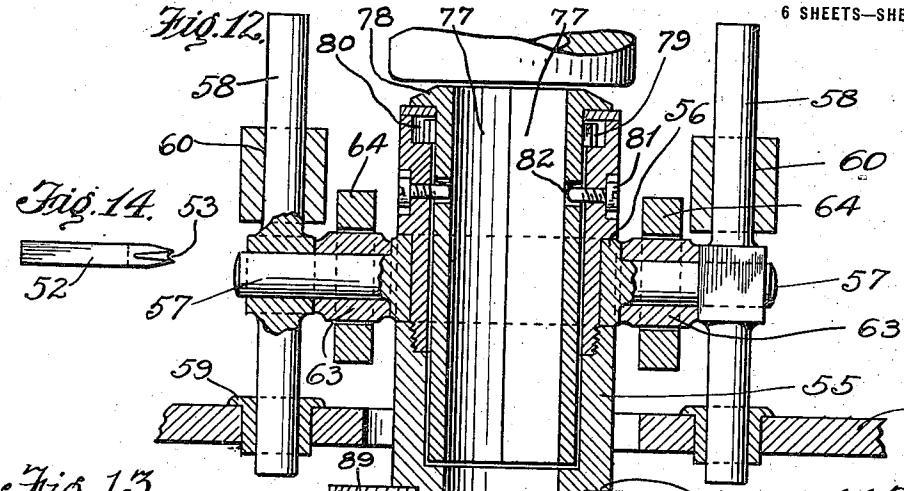


Fig. 14.

Fig. 13.

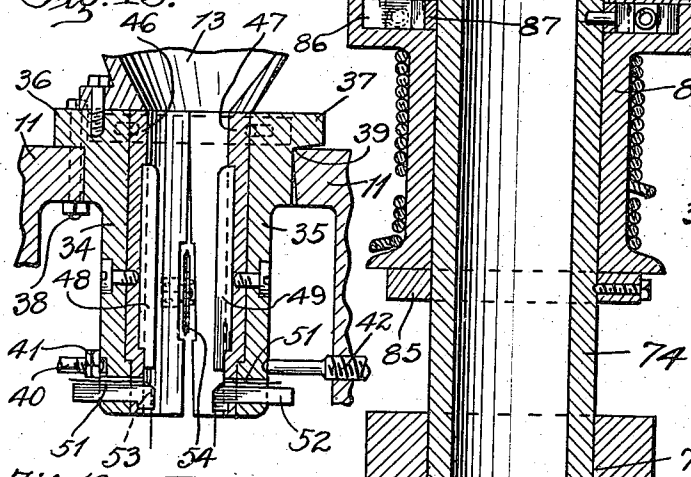


Fig. 15.

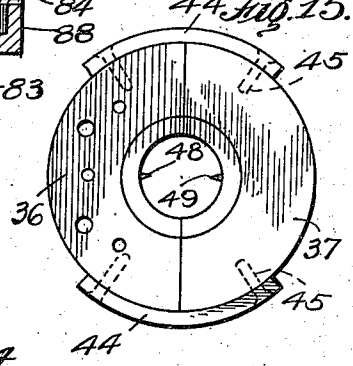


Fig. 18.

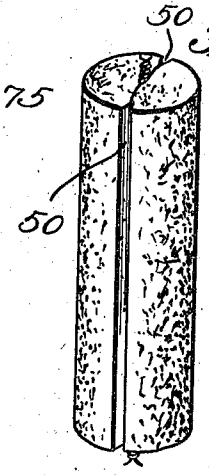


Fig. 16.

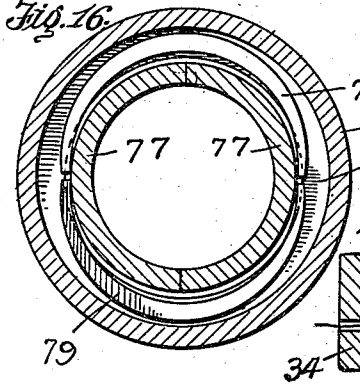
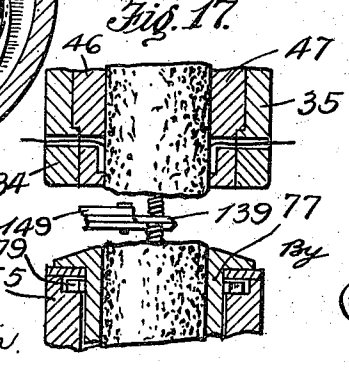


Fig. 17.



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UNITED STATES PATENT OFFICE.

IRA FOREMAN, OF LONG BEACH, CALIFORNIA, ASSIGNOR TO FRANK W. THOMPSON, OF LOS ANGELES, CALIFORNIA.

MATERIAL-COMPRESSING MACHINE.

1,250,702. Specification of Letters Patent. Patented Dec. 18, 1917.

Application filed May 10, 1915, Serial No. 27,071. Renewed May 17, 1917. Serial No. 169,340.

To all whom it may concern:

Be it known that I, IRA FOREMAN, a citizen of the United States, residing at Long Beach, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Material-Compressing Machines, of which the following is a specification.

This invention relates to improvements in material compressing machines and particularly of that type adapted for receiving materials of various kinds that it may be desired to compress and form into a compact body, mass, stick or bar, the composite piece or stick thus formed being divided into suitable lengths and bound by a strong holding means. The machine is especially well adapted for the compressing of sawdust, shavings, chips and the like into solid masses or sticks and binding holding wires about the same.

I am aware that machines of this general type have been used heretofore but in such machines difficulty has been experienced in breaking and rotating the sticks rapidly enough for getting the best results and in distributing the strain so as not to put too much work upon the material compressing portions of the mechanism.

It is an object of the invention to provide a machine in which the mechanism for controlling the breaking and twisting of the sticks formed, is driven in conjunction with the material compressing plunger mechanism, but without placing strain or twisting action thereon.

It is a further object of the invention to provide a machine of the type mentioned in which cables are employed for operating the twisting mechanism in twisting the binding wires between the divided sections of the material, in proper timed relation to the other parts of the machine.

It is a further object of the invention to provide such a machine with a quick acting material separating or breaking mechanism, thus insuring a quick separation of the parts of the compressed material as the twisting operation begins, for fastening the binding wires in place.

With these and other objects in view the invention comprises certain novel constructions, combinations and arrangements of parts as will hereinafter be more fully described and claimed.

In the accompanying drawing forming a part of this specification:

Figure 1 is a front elevation of a machine constructed in accordance with this invention.

Fig. 2 is a view partially in elevation and partially in vertical section, illustrating the construction of the material receiving hopper and showing the die in which the material is pressed and the mechanism for separating the same, twisting the binding wires and cutting the same.

Fig. 3 is a detail view in edge elevation showing the reciprocating cam employed in the machine, a portion of the cross head or slide for operating the same, and the guide therefor, being shown in section.

Fig. 4 is a detail side elevation of the same, parts of the machine frame being shown in section.

Fig. 5 is a detail side elevation upon an enlarged scale of the cable mechanism for actuating the twisting mechanism of the machine.

Fig. 6 is an edge elevation of the same.

Fig. 7 is a detail transverse sectional view taken through the ratchet mechanism for turning the material twisting device, the parts being shown upon an enlarged scale.

Fig. 8 is a fragmentary detail sectional view showing the wire cutting jaws of the cutting mechanism in closed position.

Fig. 9 is a detail sectional view upon an enlarged scale taken upon the line 9—9 of Fig. 2.

Fig. 10, is a transverse sectional view taken through the machine just above the twisting device and showing the parts upon an enlarged scale.

Fig. 11 is a fragmentary detail sectional view showing the forked member or lever for moving the twisting device so as to break off sections of the compressed stick of materials.

Fig. 12 is a detail central sectional view taken vertically through the twisting mechanism of the machine.

Fig. 13 is a vertical central sectional view through the compressing chamber and hop-

per of the device showing the means for guiding binding wires into kerfs formed in the stick of compressed material.

Fig. 14 is a detail plan view upon an enlarged scale showing the upper edge of one of the wire guiding members.

Fig. 15 is a top plan view of the compressing guide.

Fig. 16 is a transverse sectional view taken horizontally through the upper portion of the twisting device in line with the springs employed for holding the sections of the material receiving member together.

Fig. 17 is a fragmentary detail sectional view through the adjacent ends of the compressing die and the twisting member, showing the wire cutter thrust between them.

Fig. 18 is a detail perspective view of a compressed stick of material with the binding wires fastened thereon, as when the said stick is discharged from the machine.

Fig. 19 is a fragmentary detail view of a portion of a trip rod mechanism and showing a spring pressed cam block carried thereby.

The details and features of the invention will now be more specifically described reference being had to the accompanying drawings, in which 10 indicates the frame of the machine, the central portion of said frame being provided with a platform 11 adapted to carry a forming die 12 and a receiving hopper 13. The upper portion of the frame 10 extends considerably above the platform 11 and supports bearings for a shaft 14, which carries a gear wheel 15 and a crank disk 16. Said crank disk 16 is provided with a wrist pin 17 which engages a pitman 18 for operating it as the shaft 14 is rotated by the gear 15. The lower end of the pitman 18 is connected with a plunger head 19 moving in guides 20 upon the frame 10 and carrying a compressing plunger 21 which is adapted to force materials to be compressed, into the hopper 13, and the die member 12. The gear 15 is usually driven by means of a pinion 22, meshing therewith and carried by a transverse power shaft 23, which is journaled in suitable bearings upon the frame 10. A pulley 24 is mounted upon the shaft 23 and may be connected by belting 25 with any suitable source of power not illustrated. The said pulley 24 preferably runs freely upon the shaft 23 and may be connected therewith when the machine is to be operated, by the manipulation of a clutch, usually of the type illustrated in Fig. 1 of the drawings. Such clutch usually comprises a friction disk 26 adapted to bear upon one side of the pulley 24. The said disk and an adjacent collar 27 are splined to the shaft 23 and operating levers 28 are carried by said collar and bear against the said disk 26. The outer ends of the levers 28 bear upon said disk through adjustable screws 29, while the inner ends engage and are adapted to be separated by, a cone sleeve 30 loosely mounted upon the shaft 23. A hand lever 31 pivoted upon the frame and having a yoke portion 32, engaging studs 33 carried by the said collar 30, is provided for operating said cone. It will be readily understood that when the lever 31 is forced inwardly to force the cone 30 between the levers 28, the friction clutch 26 will be brought tightly against the pulley 24, whereby the said disk will be turned with the pulley and the movement thereof be imparted to the shaft 23.

The platform 11 is formed with an opening therein for receiving the die member 12. Said die member is usually formed of two approximately semi-cylindrical sections 34 and 35, the upper ends of which are formed with overhanging flanges 36 and 37, which rest upon the upper surface of the platform 11. The die section 34 is usually immovably held in position being secured to the platform 11 by one or more bolts 38. The other section 35 is so made as to rock slightly upon the edge 39, formed upon the platform 11. Such rocking action is valuable when the materials compressed become too tightly wedged within the die and a slight separation of the die sections caused by the rocking of the section 35 will relieve the extreme tightness of the materials and permit them to be pushed on through the die. The lower ends of the die sections are generally supported also, the section 34 resting against an abutment bolt 40 carrying abutment nuts 41, said bolt being fixed upon the frame of the machine. The lower end of the other die section 35, preferably rests against an adjustable abutment bolt 42 and the outer end of the said bolt is provided with a handle 43 by which the bolt may be turned upon its threads, for easing up on the die section 35 when there is danger of the compressed materials sticking within the die. The upper flanged ends of the die sections 34 and 35 are movably connected by curved strips 44, which have studs 45 extending into holes formed in the edges of said die section flanges. This connection holds the die sections together at the top but permits of the rocking of the section 35 in expanding or contracting the die.

The die sections are usually formed with lining sections 46 and 47, the inner surfaces of which form an approximately cylindrical passage large enough to receive the plunger 21. The hopper 13 is mounted upon the upper ends of the die sections 34 and 35 and the lower contracted end thereof is made to just fit over the opening in the die lining sections 46 and 47.

The loose materials are continuously forced into the die at each reciprocation of the plunger 21 and are pushed downwardly

through said die forming a continuous stick of compressed materials. These materials forming the stick being usually sawdust, shavings and the like, are preferably bound together by binding wires whereby the small particles thereof will not be likely to work loose or become separated before it is desirable. In binding such loose materials it is found necessary to deeply embed the wires in the compressed stick as otherwise the shavings will quickly curl outwardly from beneath the said binding means when placed in a fire thus permitting too rapid disintegration of the stick to form a good fuel. This difficulty is obviated by the use of knife pieces 48 and 49 mounted opposite each other in slots formed upon the inner surfaces of the lining sections 46 and 47. As the material is forced through the die, the knife pieces will form deep kerfs in the opposite sides of the compressed stick as indicated at 50 in Fig. 18 of the drawing.

Binding wires enter the die from spools through openings 51 formed in the walls of the die sections and wire guiding pieces 52 mounted in the die section adjacent to said openings 51, and having grooves 53 at their inner ends, guide and lay the wires in the grooves or kerfs 50. As the stick of material descends in the die it is thus forced between the wires which can be twisted at the ends of the stick for holding them tightly in place, as hereinafter more fully described.

The fixed die section 34 has journaled thereon a wheel 54, the periphery of which is provided with sharp serrations adapted to engage the composite stick of materials passing through the die, said wheel being thus turned and utilized as hereinafter described for causing the further operations upon the said stick when it has attained a given length. The adjacent meeting edges of the die sections are slightly cut away to accommodate the said serrated wheel 54 as shown in Fig. 13.

Below the die mechanism a mechanism is located for receiving the stick of compressed materials, the mechanism being adapted for breaking off said stick in suitable lengths, twisting and securing the binding wires about the same and for cutting off the said binding wires after they have been twisted. It is an important feature of this invention that the breaking of the stick and the separation of the sections thereof, is accomplished quickly so that the wire cutting knife or mechanism may be thrust quickly between the sections for clipping the twisted wires. The mechanism for accomplishing these purposes forms a novel portion of this invention.

The stick breaking and twisting mechanism comprises an outer cylinder 55 engaging and being revolubly supported by a bearing collar 56. The said collar 56 has laterally projecting trunnions 57, the outer ends of which engage bearings formed in guide rods 58. The lower ends of said guide rods reciprocate in guide bearings 59 in a lower platform 62, while the upper ends of said guide rods 58 engage bearings 60 in the upper ends of brackets 61 which are mounted upon said platform 62. Said lower platform is supported below the platform 11 and about half way between the same and the base of the machine. Between the rods 58 and the cylinder 55, antifriction rollers 63 are loosely mounted on the trunnions 57 and the bifurcated ends 64 of a yoke 65, engage said rollers and operate to raise and lower the cylinder 55. The side bars of said yoke lever 65 are pivotally mounted on fulcrum brackets 66 which rise from the said platform 62. The said yoke 65 is provided with an operating projection portion 67 having a socket 68 in the end thereof, adapted to extend into the parts of, and fit upon and receive a yoke operating stud or projection 69 which is carried by a reciprocating member or rod 70. The said stud 69 is usually provided with an antifriction roller 71 as clearly shown in Fig. 11. The projection 67 of the yoke is provided with a heel portion 72 which is struck by the roller 71 to cause the lifting and supporting of the cylinder 55 by said yoke 65. The said projection 67 is also provided with an elongated guiding toe portion 73, which insures the proper leading of the roller 71 to the socket 68 when it approaches the outer end of the yoke to depress the same for twisting the cylinder 55. The movement of the stud 69 with the reciprocating member or rod 70 will be hereinafter more fully described.

The lower end of the cylinder 55 is provided with a reduced cylindrical extension 74, the lower end of which engages a guide bearing 75 formed in the end of a bracket 76 carried by the base of the machine. The upper larger portion of the cylinder 55 has mounted within it semicylindrical sections 77 provided with supporting flanges 78 at their upper edges. The said sections 77 do not quite fill the interior of the cylinder 55 and may thus be slightly spread when the stick of compressed materials is forced through them. C-springs 79 are mounted in annular recesses 80 formed in the upper end of the cylinder 55, and have their free ends bearing upon the said sections 77, so as to tend to force them toward each other with a yielding pressure, as will be clearly understood by reference to Figs. 12 and 16 of the drawings. The sections 77 are prevented from turning with respect to the cylinder 55 by means of lug screws 81 carried by the cylinder 55 and projecting at their inner ends into apertures 82 formed in the walls of the sections 77.

Loosely mounted upon the lower reduced cylindrical portion 74 of the twisting cylinder 55 is an actuating sleeve 83, the said sleeve being limited against upward movement by the shoulder 84 formed at the lower end of the larger portion of said cylinder. A collar 85 rigidly fastened upon the reduced portion 74 prevents the said sleeve 83 from slipping downwardly upon the cylinder. The upper end of the sleeve 83 is provided with a flange portion having a recess 86 therein for accommodating a ratchet member 87 which is rigidly secured to the cylinder. Said sleeve is also provided with outwardly projecting portions 88 opposite said ratchet 87, in which are mounted pawls 89 which engage the teeth of said ratchet 87. Springs 90 bear upon said pawls for pressing them continuously against the said ratchet. The structure is thus such that when the sleeve 83 is turned in one direction the pawls will catch upon the teeth upon the ratchet 87 and turn the same together with the cylinder 55. When the sleeve is reversed and turned in the opposite direction the pawls will merely slip over the teeth and not turn the said cylinder. In this way the cylinder only turns in a direction proper for twisting the severed portion of the stick of compressed materials, after each breaking off of a stick section by the lowering of the cylinder. The bearing portion 75 of the bracket 76 is arranged so that it will not interfere with the movement of the cylinder 55 downwardly to the extent it is carried by the action of the yoke member 65, the downward movement of the inner end thereof being limited by the platform 62. The sleeve 83 is rotated first in one direction and then the other by a suitable cable mechanism operated by the movement of the reciprocating rod 70 and the operation of the said rod will now be described first.

The rod 70 is preferably a rectangular bar, generally square in cross section, the upper end thereof engaging a guide bearing at 91 projecting from the upper part of the frame 10, while the lower portion of said rod passes through guide bearings 92 and 93 upon the platform 62 and the base of the frame 10 respectively. The said rod is reciprocated at suitable intervals by means of a cross head 94 which slides in a vertical guideway 95 mounted upon the upper part of the machine frame 10. The said cross head 94 is pivotally connected with a pitman 96 and the said pitman has a bearing upon a wrist pin 97 upon a gear wheel 98. The said gear wheel 98 is carried by a short shaft 99 which is journaled in a bearing 100 at the upper portion of the frame 10. The gear 98 meshes with the gear teeth upon the periphery of the disk 16 whereby it receives its power for driving the cross head 94. Projecting from the cross head 94 is an annular arm 101 which extends around two sides of the rod 70 as clearly shown in Figs. 3, 4 and 9. At a proper point upon the rods 70 is secured an abutment block 102 arranged in the path of the said arm 101, whereby the rod is carried by said arm to the lower extreme of its movement. The rod remains in that position until the composite stick projects below the die the distance that it is desired to extend the same for forming the stick sections of desired lengths.

The said rod 70 is adapted to be raised by the arm 101 at the proper time by the adjustment of a trip piece 103 which normally occupies space in a depression 104 upon one side of the rod 70. The said trip piece is pivotally connected with the rod 70 by means of links 105 and is normally locked by a latch member 106 which is pivotally mounted on the opposite side of the rod 70 from the trip piece 103. As indicated in dotted lines in Fig. 4 the said latch piece or member 106 is approximately S-shaped, its upper end curving outwardly so as to engage an aperture 107 in an arm 108 which extends laterally from one edge of said trip piece 103 across the rod 70. When locked by the said latch member 106 the trip piece 103 will be held in the said recess 104, so that the arm 101 may move back and forth over the same, without lifting the rod 70. A spring 109 connecting the free end of the arm 108 with the rod 70 normally tends to throw the trip piece 103 outwardly and into the path of the said arm 101, so that the said arm will engage the lower end of said trip piece and lift the rod 70. The lower end of the latch member 106 is curved in the opposite direction from the upper end and is engaged by a spring 110, so that the said latch piece will remain in locking engagement with the arm 108, until it is positively moved against the action of the spring 110. The said latch piece is not thus moved however until the stick of compressed materials has attained a proper length and at that time it is positively moved by the action of a trip rod 111, which is pivotally connected at its lower end to a trip lever 112, pivotally mounted at 113 upon the under side of the platform 11. One end of the trip lever 112 is curved as at 114 and is adapted to be struck by studs 115 projecting from one side of the serrated wheel 54. The said studs 115 will operate the trip lever 112 at suitable intervals to draw the trip rod 111 downwardly and bring a cam block 116 carried thereby, into contact with the lower end of the latch member 106. The cam block is pivoted to the trip rod 111 at 117 and is normally held against a limiting pin 118 by a spring 119. When the trip rod 111 is lowered a cam face 120 will move the lower end of the latch member 106, so that the up-

per end will release the trip piece 103 and permit the spring 109 to throw it outwardly. The rod 70 will then be carried upwardly by the next upward movement of the arm 101. When the rod 70 descends again the lower end of the trip member 106 will engage an inclined face 121 on the end of the cam block 116 moving the said cam block to one side as it passes. The trip piece 103 is pushed inwardly again for latching by means of a spring pressed bolt 122 mounted adjacent to the bearing 91 as will be clearly understood by reference to Fig. 3 of the drawings. The trip rod 111 is normally pulled upwardly by means of a spring 123 which connects the said rod with the frame 10.

The said rod 70 also carries means for actuating the cables which rotate the sleeve 83. Said means comprises a cross head 124, having arms 125 and 126 extending in opposite directions from the said rod. The arm 125 carries a group of pulleys 127 while the arm 126 carries a group of pulleys 128. A cable, rope or other flexible device as 129 is wound around the pulleys of the group 128 and the pulleys of another group 130, one end of the cable being connected by means of an eye bolt 131 with the arm 126. After passing around the individual pulleys of the groups 128 and 130, cable 129 passes over a guide pulley 132 fastened upon a standard 133 of the machine frame and thence to the upper portion of the sleeve 83, about which it is wound a suitable number of times to make it possible to turn the said sleeve the desired number of times.

A second cable 134 is connected by an eye bolt 135 with the arm 125 and passes around the pulleys of a group 136 and those of the group 127 and thence about the guide pulleys 137 and 138 on the frame of the machine to the lower portion of the sleeve 83, upon which it is wound and fastened. It will thus be evident that when the rod 70 is elevated the cable 129 will be pulled upon through the agency of the group of pulleys 128 and 130 so as to rotate the sleeve 83 and through the agency of the ratchet 87, turn the twisting cylinder 55. When the rod 70 is lowered again the cable 134 will reverse the sleeve 83 and cause the winding of the cable 129 about the upper portion of the sleeve 83 again. A proper tension is maintained upon the cable 129 by mounting the group of pulleys 130 in a yoke carried by a spring controlled rod 139 which passes through a bearing secured to the platform 62 and has a spring 140 interposed between said bearing and a nut 141 secured to the end of said rod 139. The group of pulleys 136 is similarly mounted upon a spring actuating rod 142 mounted on the upper part of the frame 10, a spring 143 normally moving said rod upwardly. Any slackness in the cables is also thus taken up by the spring controlled mounting of the said groups of pulleys 130 and 136. Since the cable 134 only performs the light work of reversing the sleeve 83 and rewinding the other cable 129 thereon, it need not be made as heavy and strong as the said cable 129. The cable 129 should be of ample strength to rotate the cylinder 55 in its bearings and twist the wires between the separated portions of the composite stick. The best result in practice is obtained by the use of wood, or fiber or other pulleys, of material softer than the cables instead of metallic pulleys in connection with the cables 129 and 134, especially when wire cables are used, for such pulleys do not wear the cables and there is no slipping of the cables on the pulleys.

After the cylinder 55 has been lowered and the wires twisted together between the separated parts of the sticks of compressed materials, the twisted portion of the wires is severed by a suitable cutting mechanism, about midway of the twisted portion of the wires. For accomplishing the cutting of the wires, cutting blades 139 are pivoted at 147 to a slide 149 which is mounted in bearings 144 on a standard 145. The pivoted blades are thus movably held with respect to each other to form shears which may be thrust between the broken stick sections for clipping the twisted wires as clearly shown in Fig. 17. The outer ends of the shear blades have regular slotted extensions 146, the slots of which engage pins 148 upon the said standard 145. The structure is such that when the slide 149 is pulled outwardly the blades will be opened as clearly shown in Fig. 10, and when the slide 149 is thrust inwardly the said blades will be brought together so as to snip the wires as shown in Figs. 8 and 17.

In order to reciprocate the slide 149, and also to accomplish the reciprocation in proper timed relation to the movements of the stick operating and twisting mechanism, an operating rod or bar 150 is secured to the outer end of the slide 149 and is provided with an antifriction roller 151 arranged to engage a cam path 152 formed upon the face of the cam plate 153 which is rigidly secured to the reciprocating rod 70. The outer end of the rod 150 is guided and braced by a bearing in the end of a bracket 154 which projects from the frame of the machine 10. The lower end of the cam path 152 is curved inwardly in such a manner that when the rod 70 has been elevated sufficiently to lower the cylinder 55, through the agency of the yoke member 65, the roller 151 will travel inwardly and cause the shear blades to snip the wires. To avoid any possibility of the catching of the roller 151 at the lower end of the cam path, an antifriction roller 155 is mounted upon the plate 153 so as to

engage said roller 151 when at the inner extremity of its movement. The said roller 155 insures a smooth reëntry of the roller 151 into the lower end of the cam path 152 as the rod 70 descends. The cutting device will thus only be operated when the rod 70 is raised and lowered for the separation of the stick of material and the twisting of the wires.

The operation of the machine will be so readily understood from the above description that a general reference to the operation in a connected form will probably be sufficient at this point. The machine is set in operation by the throwing of the clutch disk 26. The plunger 21 will be caused to reciprocate continuously by the rotation of the crank disk 16 and the particles to be compressed such as sawdust, shavings, chips and the like that are fed into the hopper 13 will be continuously compressed to lengthen the stick being formed in the die. The materials thus compressed will be forced between the wires 51 which have been twisted together at the bottom and as the stick passes the serrated wheel 54 it will be turned thereby. When a stick of sufficient length has been produced, the said wheel 54 will trip the lever 112 causing the unlatching and throwing out of the trip piece 103 into the path of the arm 101 which projects from the cross head 194. The rod 70 will be operated for moving the yoke member 65 and the cam plate 153, whereby the cylinder will be quickly lowered, the cable 129 rapidly rotating the same for twisting the wires, and at the same time the cam plate 153, will at the proper time thrust the cutting mechanism between the separated sticks and sever the wires. Upon the lowering of the rod 70 again, the roller 71, which has left the socket 68, will descend and come into engagement with the heel portion 72, depressing the outer end of the yoke 65, and causing the inner end thereof to raise the twisting member to its position adjacent to the die for receiving the end of the stick of compressed materials as it is lengthened and forced downwardly. The socket 68 is deep enough to allow for the rocking of the yoke without binding upon or forcing the roller 71 and its stud 69 outwardly. The cutting mechanism will have been withdrawn from between the twister and die. The operation of all the parts is thus entirely automatic when the machine is running. The completed sticks with the wires twisted at their ends, will force each other out of the lower end of the twisting member in succession.

While the machine has been shown with only one compressing plunger and coöperating parts, it will be evident that the parts may be duplicated upon the other side of the machine frame and run from the same shaft 14, for doubling or further increasing the capacity of the machine without departing in the least from the spirit and scope of the invention.

It will be observed that in the machine as above described, the pitman 18 and the plunger 21 only has the work of compressing the materials and forcing the sticks formed through the die and twister to perform, and that the pitman 96 and the cross head 94 by actuating the rod 90 accomplishes all the work of breaking the stick, twisting the wires and cutting the same. The strain of operation is thus much more evenly distributed through the parts of the machine than in former mechanisms of this type and the machine itself is more simple and less likely to get out of order than wood compressing machines of this kind that have been heretofore used. It will be evident of course that the minor details of construction, of the parts of the machine may be considerably varied within the scope of the invention.

What is claimed is:

1. A machine of the class described comprising a material compressing element, a crank mechanism for operating the same, and a twisting and binding element and crank coöperating with said first mentioned crank mechanism for actuating the said twisting and binding element.

2. A machine of the class described comprising a compressing member, a twisting and binding member, a cross head for moving the compressing member, a crank mechanism for operating said cross head, a reciprocating member for operating said twisting and binding member, a cross head for operating said reciprocating member, a crank mechanism for actuating said latter cross head, and gearing interposed between the two crank mechanisms for securing a simultaneous operation of the parts in proper timed relation to each other.

3. A machine of the class described comprising a compressing member, a crank mechanism for operating the same, a twisting member, mechanism for rotating the twisting member, and an auxiliary crank member for operating said mechanism for rotating the said twisting member.

4. A machine of the class described comprising a compressing member, a member for shaping the material operated upon by the compressing member, a material separating and twisting member, a lever for operating the latter and a reciprocating member adapted to come into contact with said lever for operating it in coöperation with the compressing member, the said lever engaging at one end the twisting member, and at the other end the said reciprocating member.

5. A mechanism of the class described comprising a reciprocating compressing

member, a material shaping member, a material separating and twisting member, a rocking yoke causing a quick separating of the material and means adapted to contact with said yoke for rocking it.

6. A mechanism of the class described, comprising a compressing member, a die member, a twisting member, adapted to form a continuation of the die and having a reciprocating movement toward and away from the same, a lever for reciprocating said twisting member and means striking said lever for operating it in conjunction with the action of the compressing member, the said lever extending from said twisting member into the path of said striking means.

7. A mechanism of the class described comprising a material compressing element, a material breaking element, a yoke member for operating said breaking member and a reciprocating member coming into engagement with said yoke member, for actuating it.

8. A mechanism of the class described comprising a compressing element, a material separating member, a rocking yoke engaging said separating member at one end, a reciprocating member adapted to come into engagement with said yoke at its other end for rocking it and means for reciprocating said yoke operating member.

9. A mechanism of the class described comprising a compressing element, a crank member therefor, a material separating element, a rocking member controlling the movement of said separating member, a rod adapted to come in contact with said rocking member for rocking it and an auxiliary crank mechanism for actuating said compressing element and said rod.

10. A material compressing machine comprising a compressing plunger, a shaping die, a material separating member, a rocking member for moving said separating member and having a socket in one end thereof projecting into the parts of an actuating member, an actuating member for said rocking member having a projection adapted to engage the socket thereof, and means for moving said actuating member.

11. A material compressing machine having a compressing element, a yoke member fulcrumed in the machine and having bifurcated end portions, the material separating member having trunnions for movably engaging said bifurcated end portions, said yoke member having a socketed operating projection, a reciprocating rod having a stud arranged to come into engagement with said socketed projection to rock the yoke member, and means for reciprocating said rod.

12. A material compressing machine having a compressing element, a material separating and twisting member, flexible means for turning said twisting member and means for pulling on said flexible means to cause the operation of said twisting member.

13. A material compressing machine having a compressing member, a material twisting member, cables for operating the twisting member, and means for actuating said cables.

14. A material compressing machine having a compressing member, a material twisting member, cables wound about said twisting member, and means for pulling upon said cables successively for turning the twisting member first in one direction and then the other.

15. A material compressing machine having a compressing member, a material separating and twisting member, a member for rotating the same, cables wound on said latter member and means for pulling on the said cables successively for actuating the rotating member and causing the movement of the twisting member.

16. A material compressing machine having a compressing element, a material separating and twisting member, an actuating sleeve movably mounted thereon, a ratchet mechanism interposed between the same and the twisting member, and means for turning the said actuating sleeve first in one direction and then the other whereby the said twisting member will be rotated by the ratchet mechanism.

17. A material compressing machine having a compressing element, a material separating and twisting member having a ratchet secured thereto, an actuating sleeve having pawls for engaging said ratchet whereby the twisting member will be turned only when the sleeve is rotated in one direction, cables wound upon each end of said sleeve for turning it back and forth, and means for pulling upon the said cables in succession for turning said sleeve and operating the twisting member.

18. A material compressing machine having a compressing element, a twisting member, cables for operating the same and a reciprocating member for operating said cables.

19. A material compressing machine having a compressing element, a material separating and twisting member, a ratchet sleeve mounted thereon, cables engaging said ratchet sleeve for turning it back and forth, pulleys engaging said cables and means for moving the pulleys to pull upon the cable successively.

20. A material compressing machine having a compressing element, a twisting mechanism, cables connected therewith for turning it, pulleys for engaging said cables, a member for moving the pulleys back and forth to pull upon and wind up the cables

successively and means for actuating said pulley moving mechanism.

21. A material compressing machine having a compressing element, a material receiving and twisting member, an actuating sleeve therefor, cables wound upon said sleeve for turning it back and forth, a cross head for pulling upon said cables successively, groups of pulleys upon which the cables are wound and tension means for pulling upon some of said pulleys to keep the cables taut.

22. A material compressing machine having a compressing element, a material receiving and twisting member, an actuating sleeve therefor, cables engaging said sleeve for turning it back and forth, a reciprocating bar mounted in the machine and having a cross head thereon, cable engaging pulleys carried by said cross head for pulling upon the cables as the bar is reciprocated, anchorage pulleys yieldingly fastened to the frame of the machine above and below the said cross head, the cables being wound about all of said pulleys and means for reciprocating the said bar whereby the pulleys upon the cross head will pull upon first one cable and then the other for turning the said sleeve back and forth, the yielding fastenings of the anchorage pulleys operating to take up any slack in the cables.

23. A machine of the class described having a compressing plunger, a crank mechanism for operating the same, a die for shaping the materials compressed, means for applying binding wires to the sticks of compressed material a twisting member for receiving the material with the wires applied thereto, means for separating the twister and die, mechanism for turning the twister to twist the wires between the separated sections of the compressed material, a cutting mechanism adapted to be thrust between said separated parts for cutting the wires and flexible connections extending to the twisting device for turning the same and a crank mechanism, coöperating with the crank mechanism of the plunger for operating the twisting device.

24. A machine of the class described comprising a compressing plunger, a shaping die having means for applying wires about the materials compressed, a twisting member for receiving and twisting the separated material and wires for binding the wires tightly in place, clipping shears for cutting said wires, cables for turning said twisting member and a plunger rod adapted to operate said cables and also said clipping shears for cutting the twisted portions of the wires.

25. A machine of the class described having a compressing plunger, a shaping die for receiving the compressed materials, said die having means for embedding binding wires within the material, a material receiving and wire twisting member, cables for turning said member, a rocking member for raising and lowering the twisting member, wire clipping shears, a reciprocating bar adapted to operate said cables, the rocking member and the said shears and means for moving said bar.

26. A material compressing machine having a compressing plunger and a shaping die, means for directing binding wires about the compressed materials, a material receiving and wire twisting member having an actuating ratchet mechanism thereon, cables for actuating said ratchet mechanism, a yoke lever for raising and lowering the said twisting member, a cutting device adapted to cut the twisted wires between sticks of materials, a cam for moving said cutting device, a reciprocating bar carrying said cam and having means for moving said yoke lever, means carried by said rod for engaging and operating said cable, a reciprocating cross head, a crank mechanism for moving said crosshead, means for connecting said rod with said cross head, and a tripping mechanism for bringing said means into action, when a sufficient amount of material has been compressed.

27. A material compressing machine having a compressing member, a shaping die, carrying means for applying binding wires to the stick of compressed material, a material receiving and wire twisting member, a device for cutting the said wires comprising a plurality of pivoted blades, said blades having angularly arranged slotted operating arms, fixed means upon the machine for engaging the slots of both said arms, a reciprocating slide carrying the said blades and means for reciprocating said slide whereby the blades will be brought together with a scissors like action for cutting the twisted wires.

28. A material compressing machine having a reciprocating plunger, a die for receiving material compressed thereby and applying binding means thereto, a material receiving and wire twisting member, a bearing member movably supporting said twisting member and having supporting trunnions projecting therefrom, guiding members carried by said trunnions, a single rocking member having spreading portions adapted to engage said trunnions for raising and lowering the twisting member, and means striking said rocking member for rocking it.

29. A machine of the class described having a reciprocating compressing plunger, a crank mechanism for actuating the same, a material shaping die carrying means for applying binding wires to the materials compressed, a material receiving and wire twisting member, a wire cutting device, a reciprocating cross head, means for driving the

same in conjunction with the movement of the plunger actuating crank mechanism, a rod adapted to be operated by said cross head, a trip mechanism for bringing the rod into operative connection with said cross head, a yoke operated by said rod and adapted to raise and lower the twisting member, cables operated by said rod for turning the twisting member to twist the wires about separated portions of the compressed materials, and a cam also operated by the said rod for operating the said wire cutting device at the proper time for cutting the twisted wires between the said separated portions of the compressed materials.

30. A machine of the class described having a compressing plunger, a crank mechanism for actuating the same, a reciprocating cross head, a crank mechanism for operating the same, gearing interposed between the said crank mechanisms for imparting movement from one to the other, a die, a material separating and twisting member, means for twisting wires about the material compressed, a wire cutting device, and a reciprocating rod adapted to raise and lower the twisting member and a flexible member wound on the twisting member and moved by said reciprocating rod for turning the same for twisting the wires, said rod also operating the wire cutting device, a trip mechanism for connecting the cross head with said rod and a mechanism operated by the compressed materials for causing the operation of the said trip mechanism, when a predetermined amount of materials have been compressed.

31. A material compressing machine having a compressing element, a twisting member, cables connected therewith for turning it, pulleys of softer material than said cables for engaging them, a member for moving the pulleys back and forth to pull upon and wind up the said cables successively and means for actuating said pulley moving mechanism.

32. A material compressing machine having a compressing element, a material receiving and twisting member, metallic cables connected therewith for turning it, wood pulleys for pulling upon said cables, wood pulleys for keeping the cables taut, and means for operating the pulling pulleys.

In testimony whereof, I have hereunto set my hand, in presence of two witnesses.

IRA FOREMAN.

Witnesses:
CHARLES C. MONTGOMERY,
MARIE FREWERT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."