May 9, 1933. D. L. SUMMEY 1,907,896

BLOCKING MACHINE

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Fig. 2.

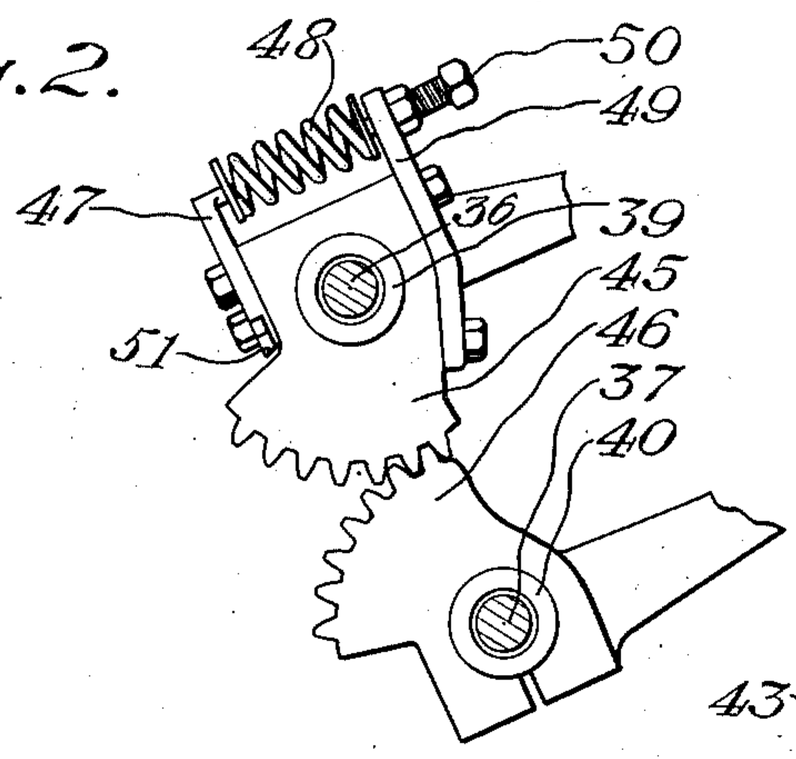

Fig. 1.

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Fig. 4.

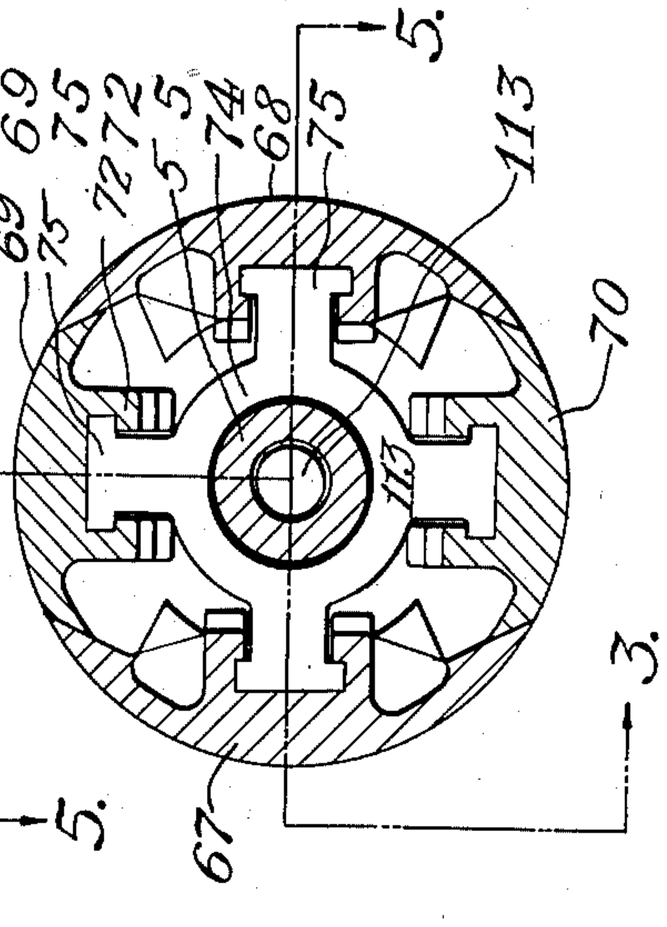


Fig. 6.

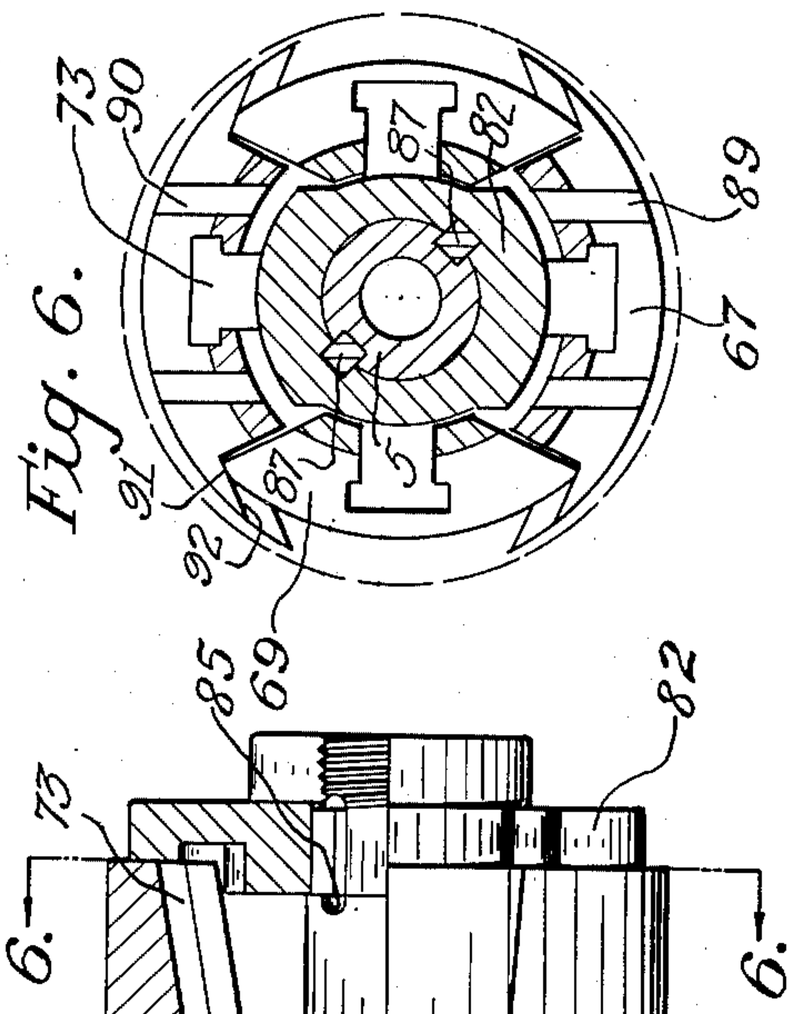


Fig. 3.

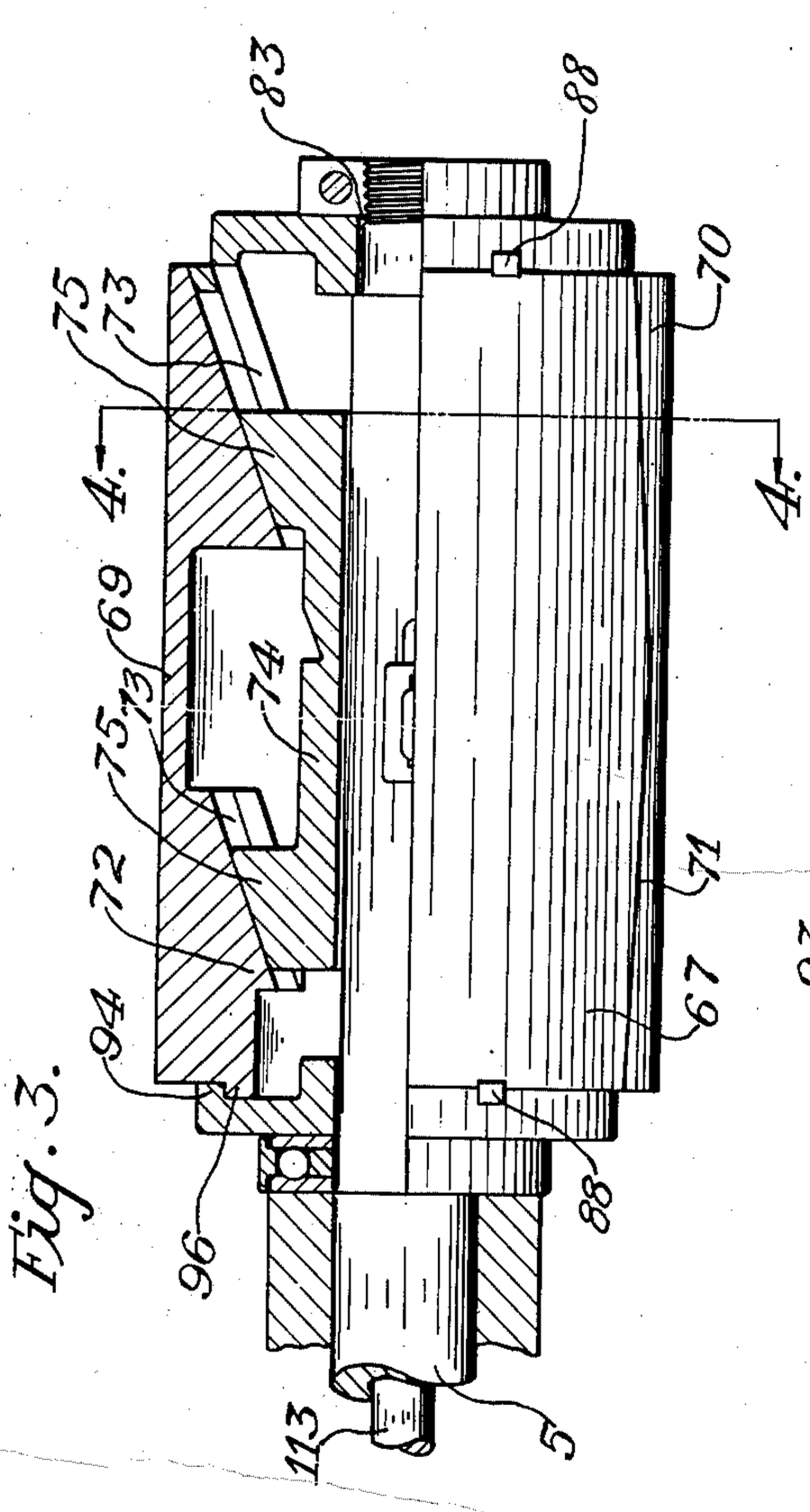
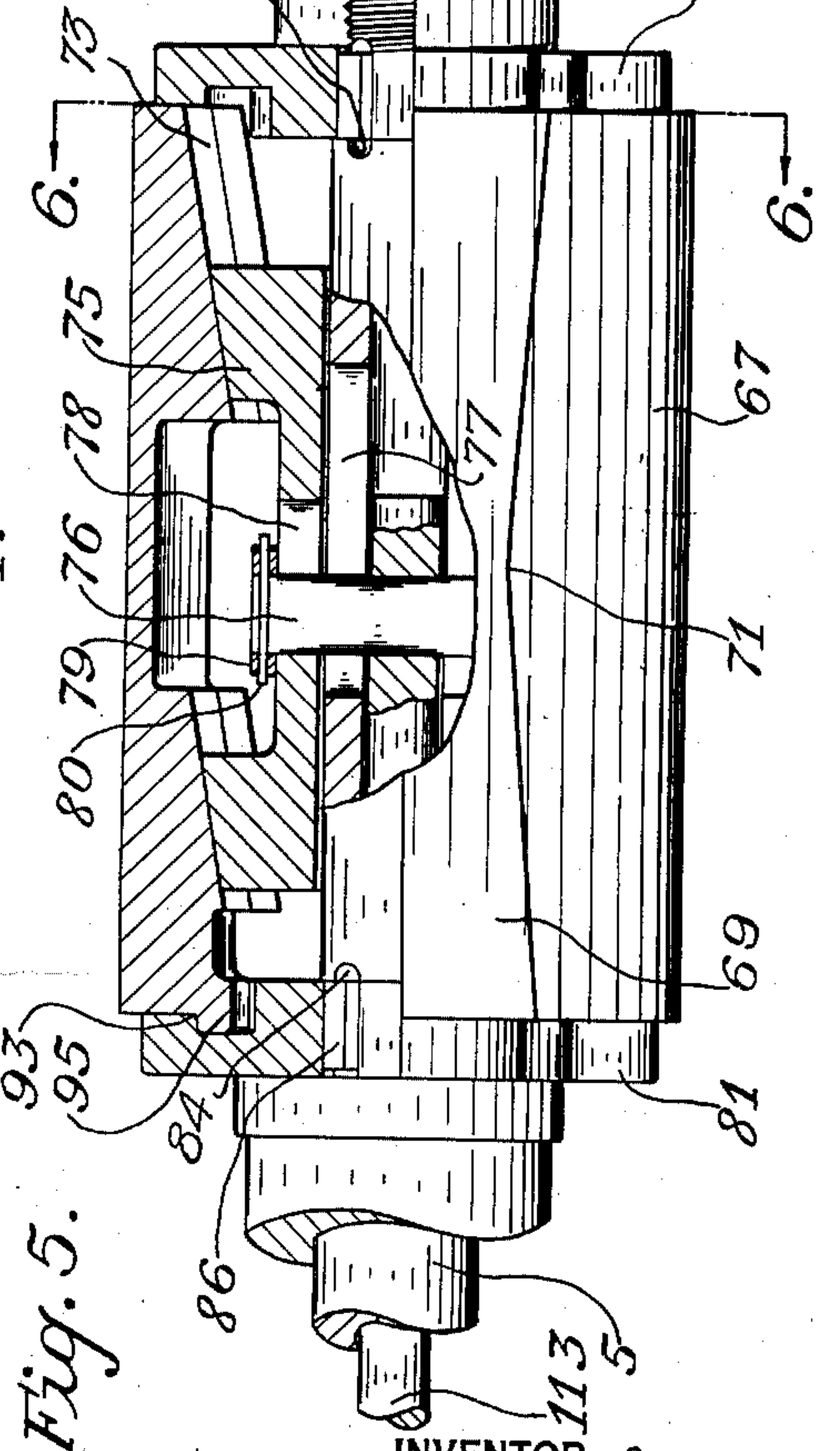


Fig. 5.



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BLOCKING MACHINE

Filed March 13, 1929

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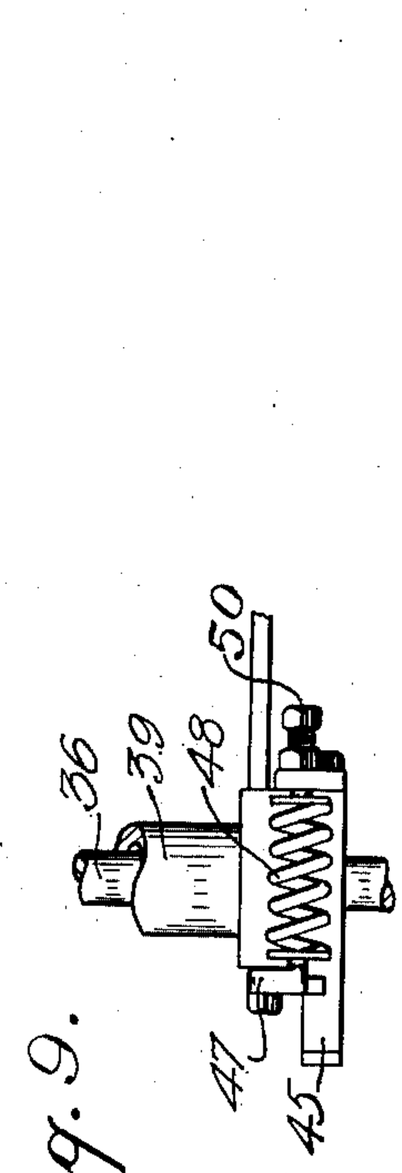

Fig. 9.

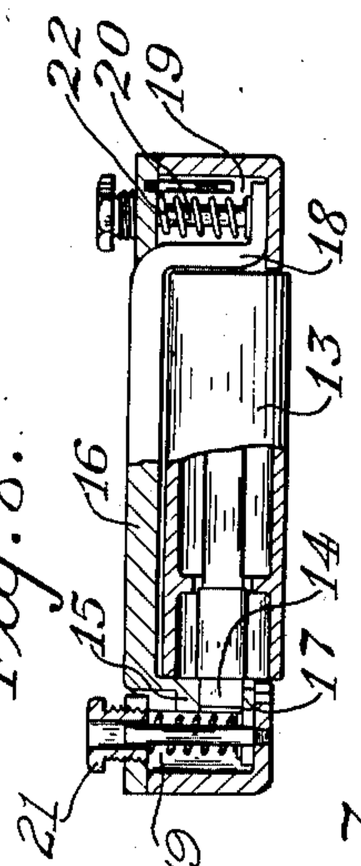

Fig. 8.

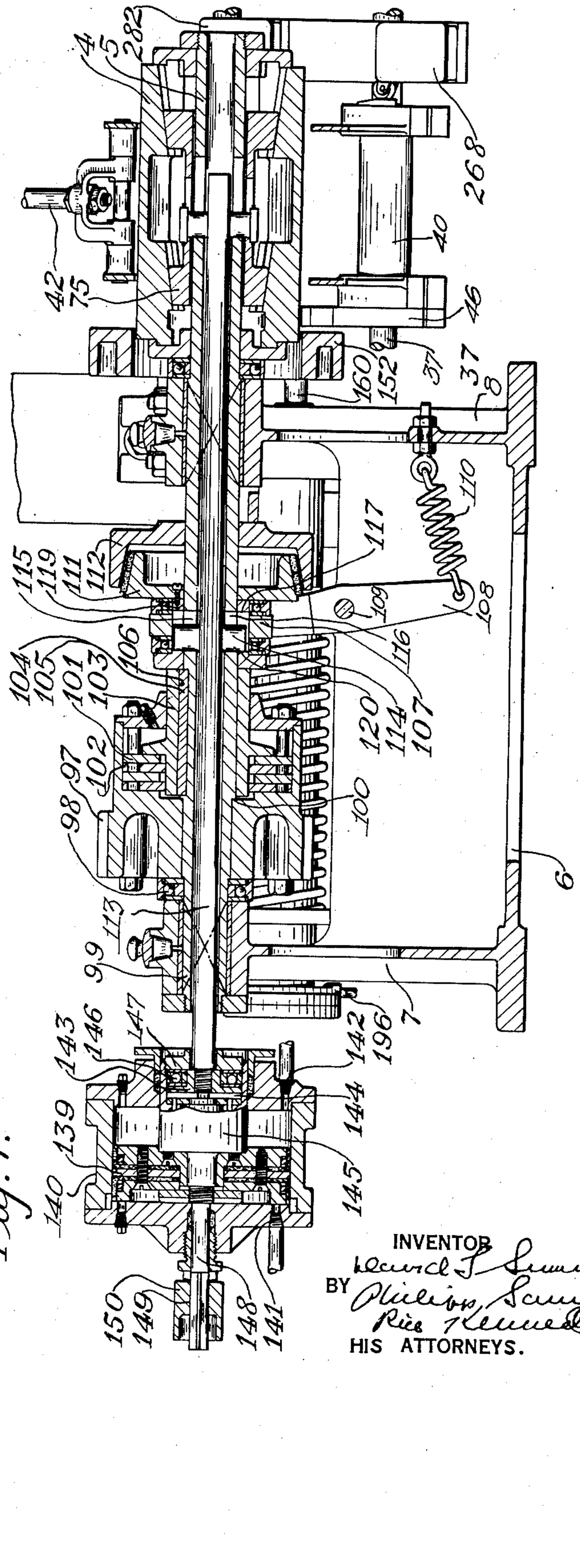

Fig. 7.

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BLOCKING MACHINE

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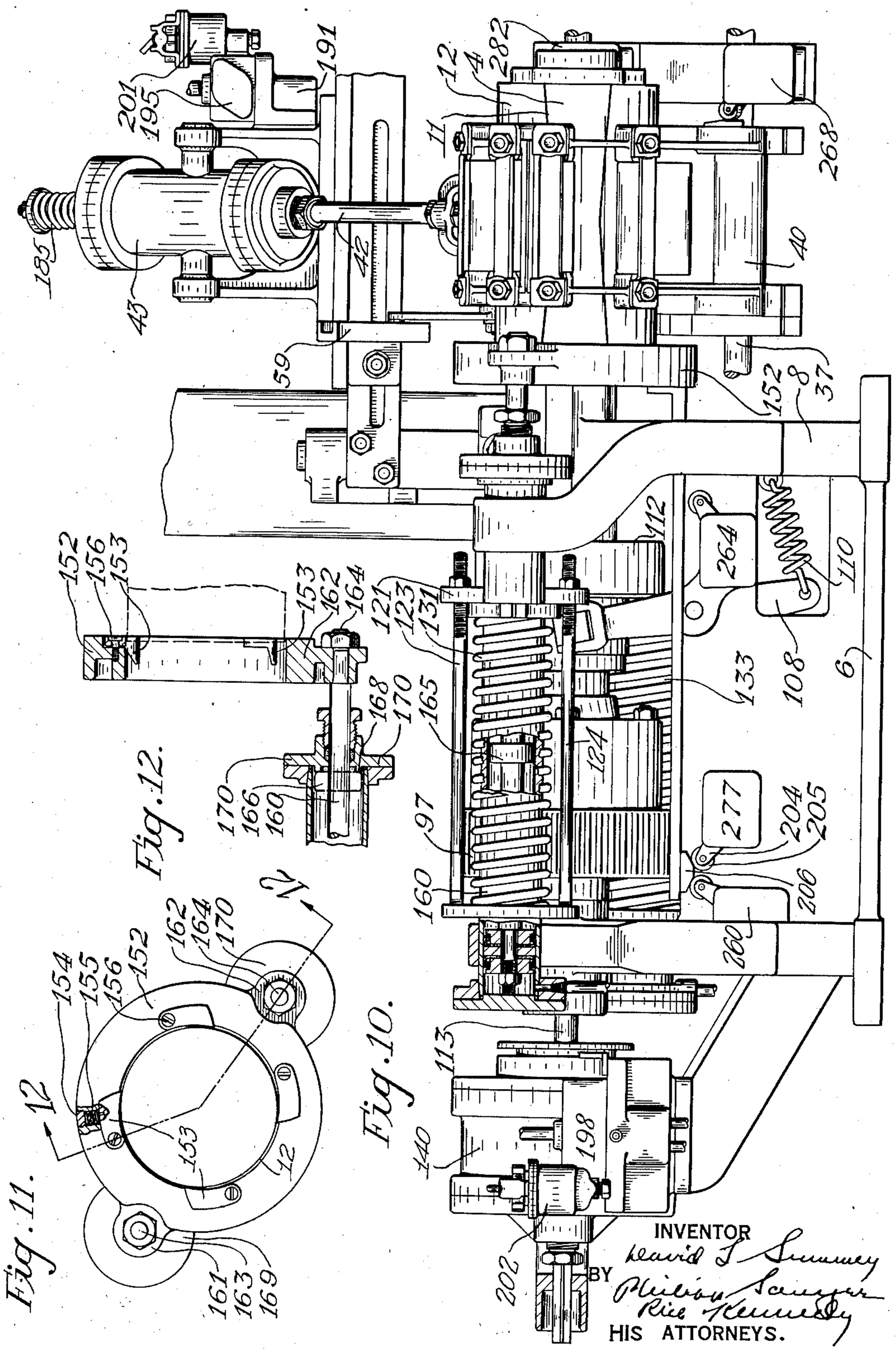

Fig. 12.

Fig. 11.

Fig. 10.

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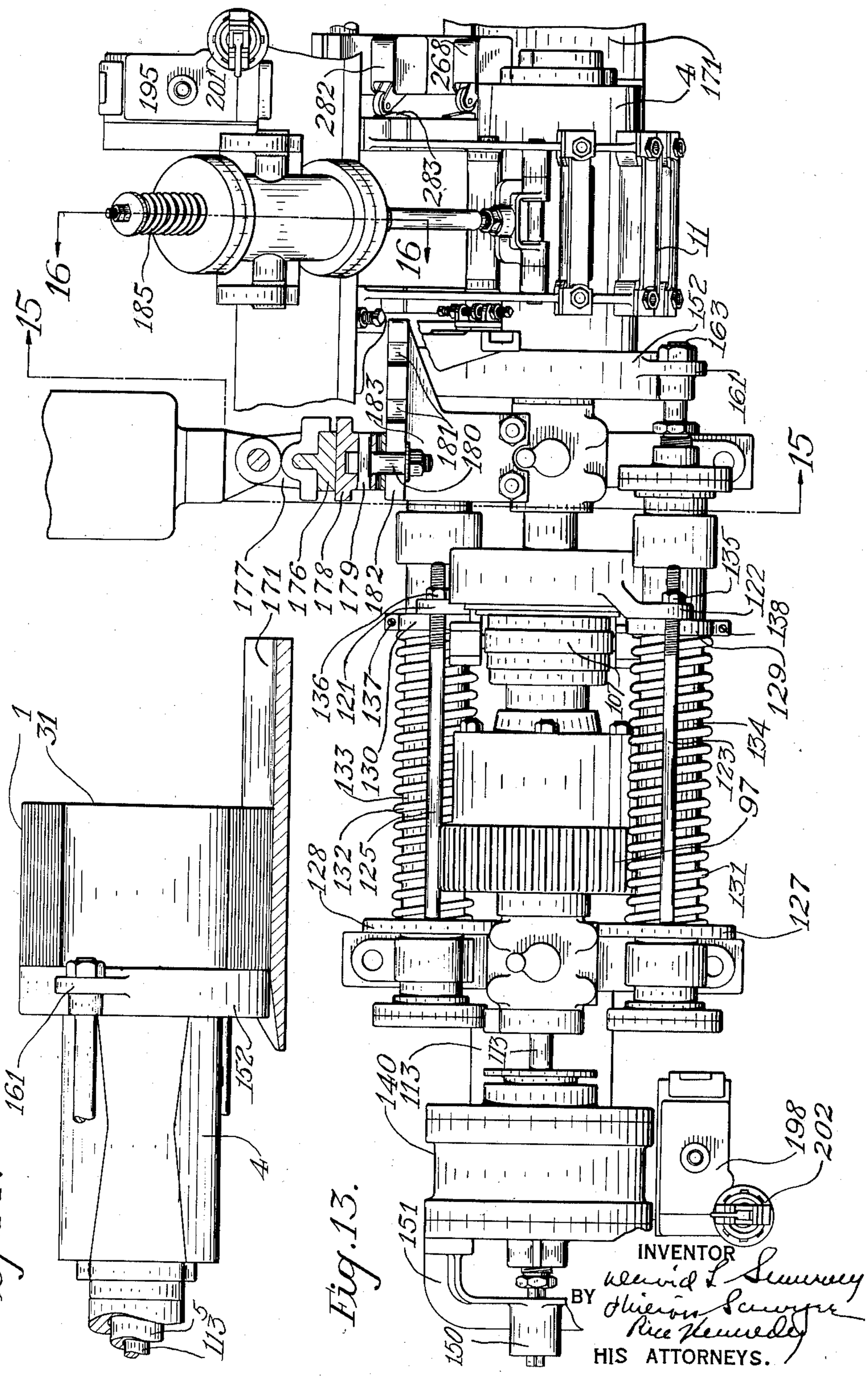

Fig. 14.

Fig. 13.

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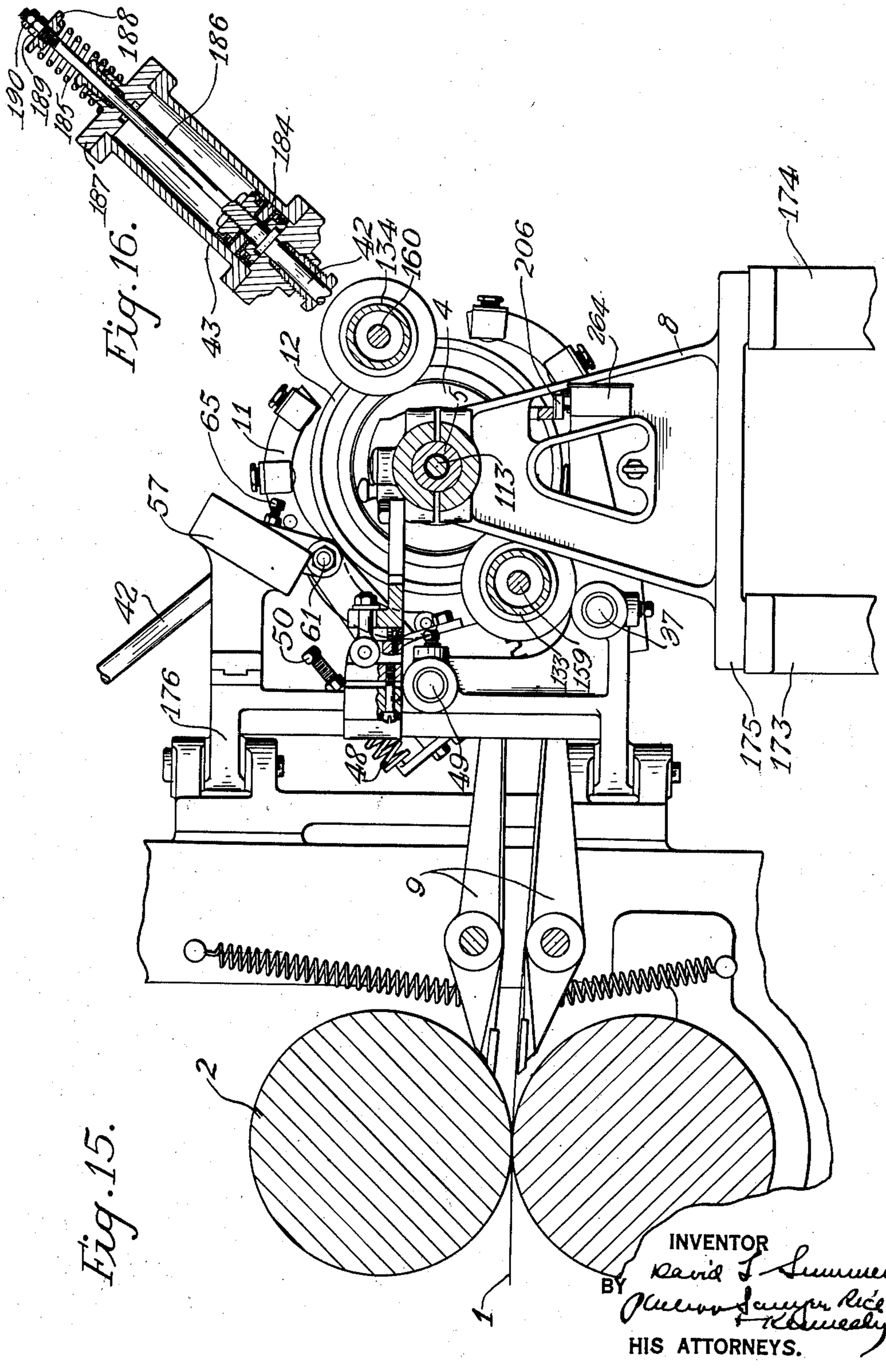

Fig. 16.

Fig. 15.

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Fig. 17.

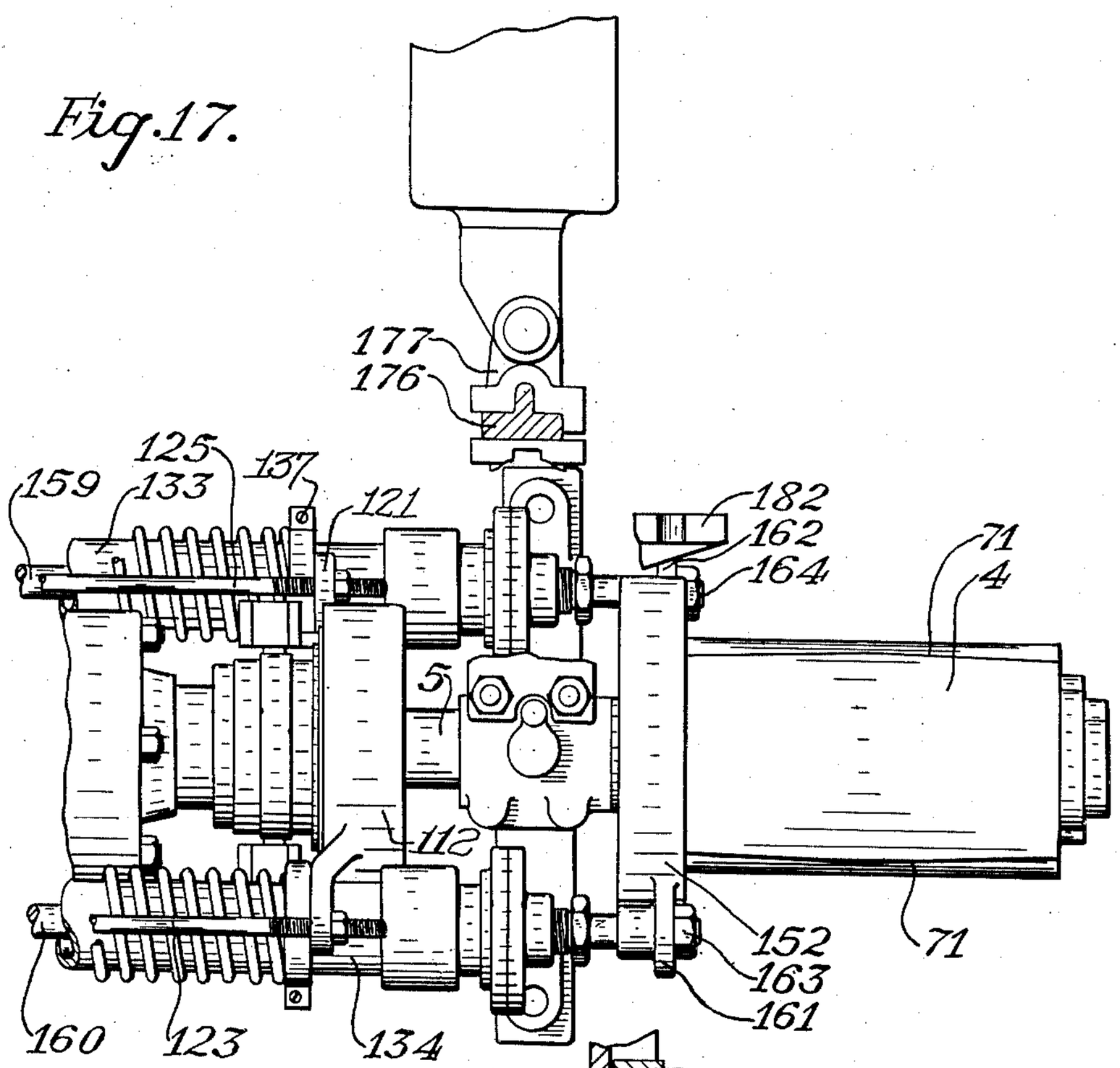


Fig. 18.

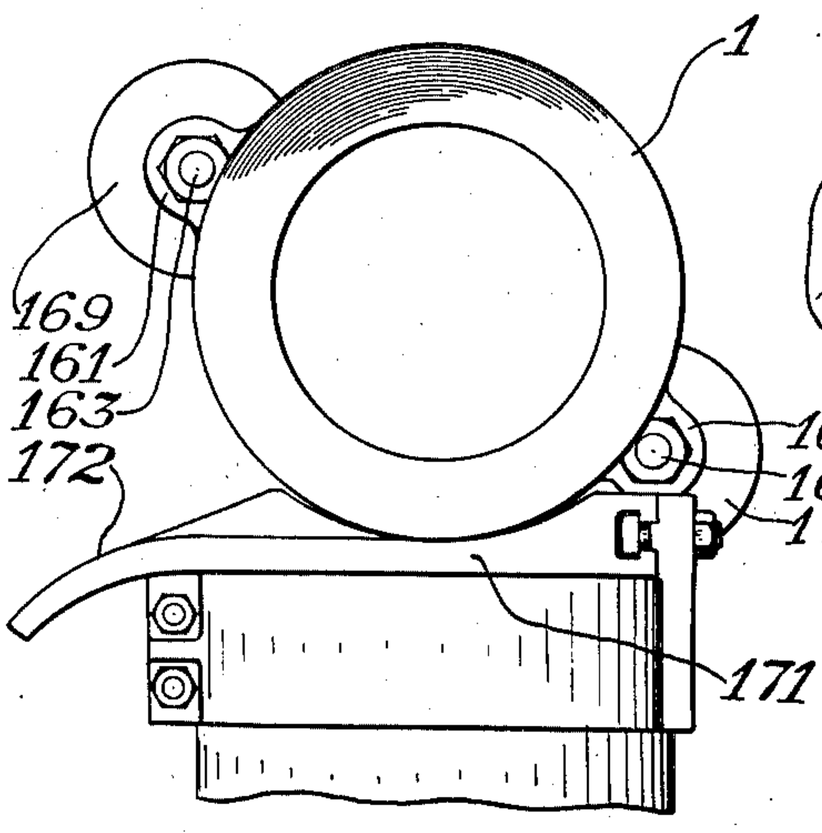
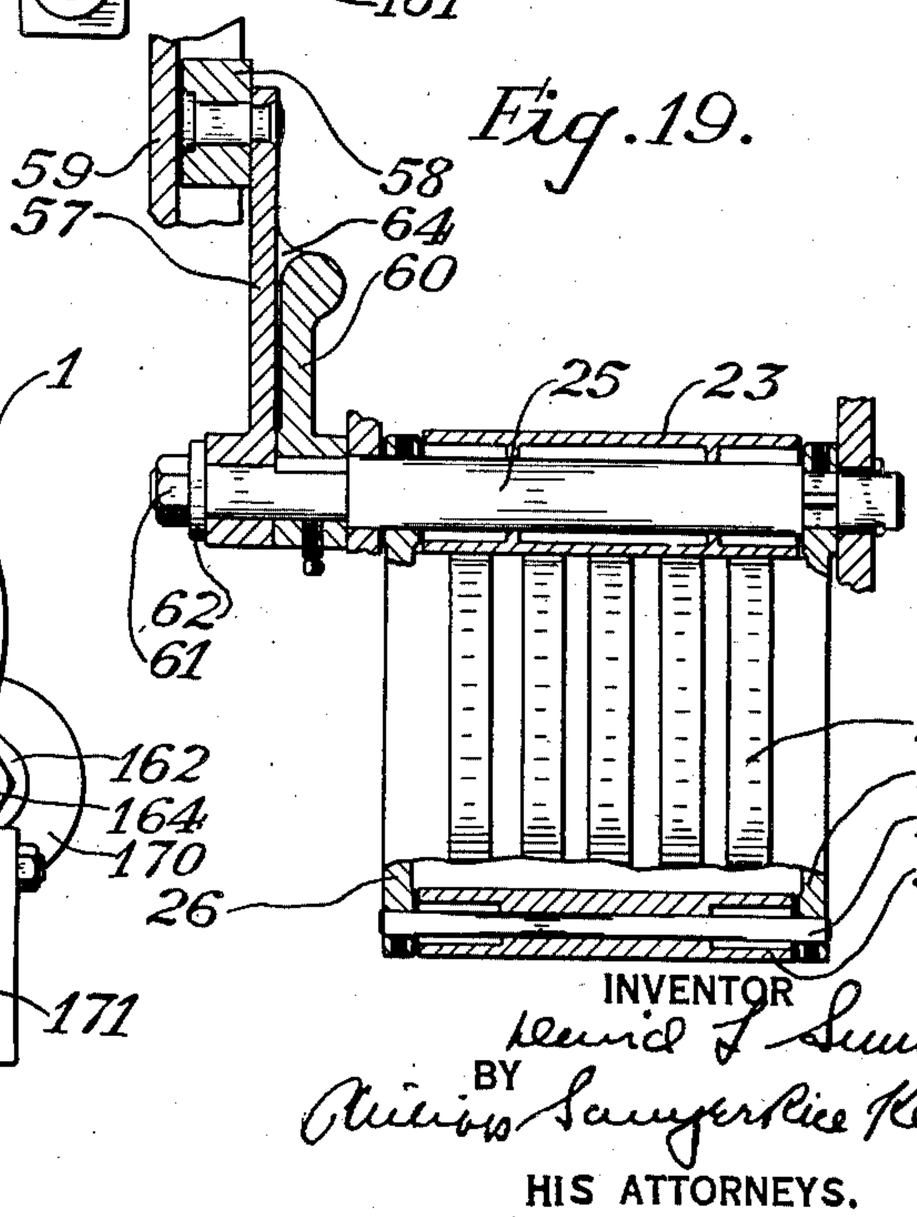


Fig. 19.



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May 9, 1933. D. L. SUMMEY 1,907,896

BLOCKING MACHINE

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Fig. 20.

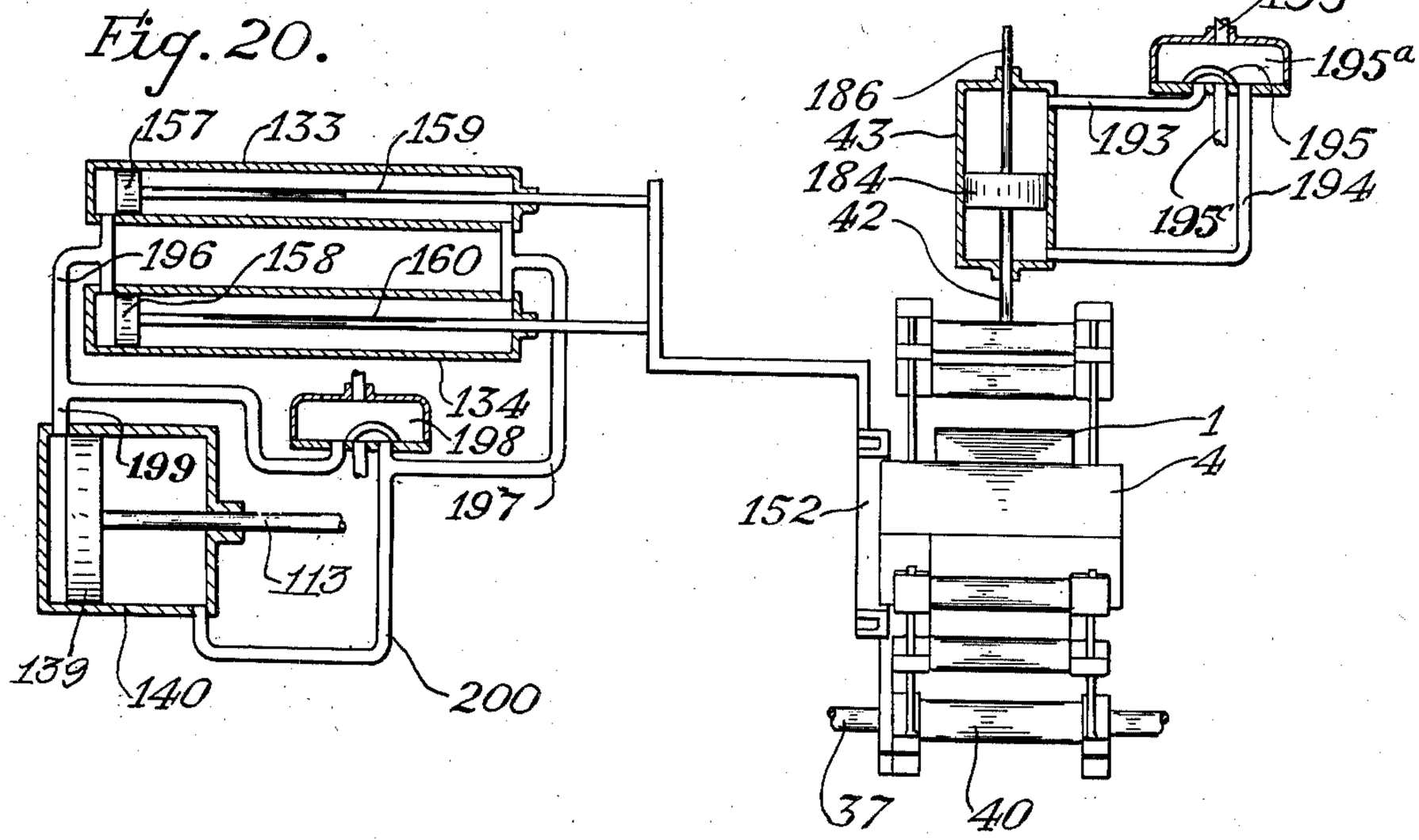

Fig. 21.

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Patented May 9, 1933 1,907,896

UNITED STATES PATENT OFFICE

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BLOCKING MACHINE

Application filed March 13, 1929. Serial No. 346,588.

This invention relates to blocking machines and more particularly to machines for coiling metal as it emerges from a rolling mill.

In order to conveniently dispose of the metal strip as it comes from the rolling mill, provision is usually made for rolling this strip into a coil. To this end, the strip is usually fed to a cylinder around the outer surface of which the strip is then wound. As soon as one strip is coiled, it is removed from the cylinder and the next strip is coiled. Cylinders for coiling metal strip emerging from rolling mills are commonly called blocks and the mechanism associated with them is termed a blocking machine.

It is an object of this invention to provide an improved blocking machine for a rolling mill in which the blocking machine may be economically and efficiently operated.

It is a further object to provide a blocking machine which requires the attention of only a single operator.

With these general objects, and others not specifically mentioned, in view, the invention consists in the features, combinations, details of construction and arrangements of parts which will first be described in connection with the accompanying drawings and then more particularly pointed out.

In the drawings—

Figure 1 is an end view in elevation of a machine constructed in accordance with the invention;

Figure 2 is a detail of part of the mechanism of Fig. 1;

Figure 3 is a front elevation in half section of a block on line 3—3 of Fig. 4;

Figure 4 is a sectional view taken on the line 4—4 of Fig. 3 showing the block expanded;

Figure 5 is a sectional view taken on the line 5—5 of Fig. 4;

Figure 6 is a sectional view taken on the line 6—6 of Fig. 5 showing the block contracted;

Figure 7 is a vertical central sectional view of the machine of Fig. 1, the section being taken on the line 7—7 of Fig. 1;

Figure 8 is an enlarged detail partly in section of a roller;

Figure 9 is a view looking at the top of the detail of Fig. 2;

Figure 10 is a front elevational view of the machine of Fig. 1;

Figure 11 is an end elevational view of the coil removing stripper;

Figure 12 is a sectional view taken on the line 12—12 of Fig. 11;

Figure 13 is a plan view of the machine of Fig. 1;

Figure 14 is a view in elevation of the block, stripper and coil after the coil is removed from the block, showing the coil receiving shelf;

Figure 15 is a view taken on the line 15—15 of Fig. 13;

Figure 16 is a sectional view taken on the line 16—16 of Fig. 13;

Figure 17 is a fragmentary view of the machine as shown in Fig. 13 with parts broken away;

Figure 18 is an end view of the coil receiving shelf shown in Fig. 14;

Figure 19 is a sectional view showing the rear strip guide, taken on the line 19—19 of Fig. 1;

Figure 20 is a piping diagram, and

Figure 21 is a wiring diagram.

Referring to these drawings, for convenience in handling, metal strip 1, (Fig. 15) after being rolled between the rolls 2 of a rolling mill (Fig. 15) is formed into a coil about a blocking cylinder or block 4 which is mounted for rotation on a shaft 5 supported by a frame 6 (Fig. 7) having upward extensions 7, 8, in which the shaft is journalled. As the strip emerges from between the rolls 2 it is guided between two straight guiding members 9 (Figs. 1 and 15) mounted for sidewise adjustment on the mill frame. These guiding members 9 maintain the strip flat until it reaches the block 4 upon which it is to be coiled.

The invention in its entirety includes means for coiling the strip around the block. This coiling may be accomplished by directing the leading end of the strip 1 in a circular path around the block surface. In constructions embodying the invention to what is now considered the best advantage, a circular

guide for the strip is employed. Although this guide may have various forms, in that here shown as an example, the guide comprises a cage-like device 11 (Figs. 1 and 15) embracing the cylindrical surface 12 of the block around which the strip travels.

Means are provided for causing the cage to contact with the block and for permitting the strip to pass between the cage 11 and the block surface 12. Although capable of various constructions, in that here shown as an example, there are distributed around the surface 12 of the block 4 a plurality of rollers 13 mounted in the cage 11 for reducing the friction between the strip 1 and the cage. In order to maintain these rollers 13 in contact with the block surface 12 means are provided for floating them radially on the block surface, so that they may adjust themselves in accordance with the position of the cage. This may be accomplished by providing them with spring mountings. To this end, the roller 13 (Fig. 8) rotates about a shaft 14 which, by a flat-headed pin 17 is held in a socket 15, formed in the ends of a supporting member 16 extending over the roller 13. The supporting members 16 are resiliently connected to the cage. As shown, the ends of the supporting member 16 are extended outwardly beneath the sockets 15 and these ends 18 extend into pockets 19 formed in the cage 11. The end extensions 18 are formed as yokes and bolts 20 extend loosely through the yokes. The lower ends of the bolts thread into the lower walls of the recesses 19 and the upper ends slide freely within hollow nuts 21 threaded into the upper walls of the recesses 19. Resiliency is imparted to the connection by means of springs 22 coiled about bolts 20 and compressed between the upper walls of the recesses 19 and the extensions 18. The cage 11 also carries, fixed therein, rollers 23, 24 (Fig. 1), which move against and away from the block and coil, not radially, but through arcs centered on the pivotal points of the cage, hereinafter mentioned.

In order to further guide the leading end of the strip around the block surface as it passes the upper roller 23 on its first revolution, there is provided an additional guiding member extending from the upper roller 23 about a quarter of a revolution around the block to a point where the leading strip end will be assured of reaching the bite of the lower roller 24. Although capable of various constructions, as here shown as an example, there are fixed to the shaft 25 (Fig. 19), on which upper roller 23 is journalled, arms 26, 27 of a frame or apron 28 having, adjacent the block a contour following closely that of the block surface. Fixed in the ends of the arms 26, 27 of the apron 28 is a shaft 29 on which is rotatably mounted a roller 30 which rolls upon the block surface.

In order to permit the strip to pass beneath the roller 30, the shaft 25, to which the arms 26, 27 of the apron 28 are secured, is journalled within the cage 11.

In accordance with the invention the cage 11 is movable away from the block surface 12 in order to permit the coil 31 of metal strip to grow and also to permit the removal of the coil 31 when completely wound. This may be accomplished by splitting the cage and opening it in sections. Although capable of various constructions, as here shown as an example, the cage 11 comprises two symmetrical sections 32, 33, each having a curved portion 34, having substantially the contour of the block, and a straight portion 35 extending backwardly substantially tangent to the curved portion 34 (Fig. 1).

The invention provides means for opening the cage 11 and closing it about the block. Although capable of various constructions, in that here shown as an example, the cage sections 32, 33 are pivoted respectively, on shafts 36, 37 (Fig. 1). To this end, the arms 35 are mounted on sleeves 39, 40 (Fig. 2), which revolve respectively on shafts 36, 37. Carried on one of the cage sections, e. g. 32, is a yoke 41 (Figs. 1, 13) to which may be secured a fluid actuated piston rod 42 operating in cylinder 43, as later more fully described. For manual operation there may be provided a handle 44 secured, as shown, to the upper cage section 32. In order to move both sections of the cage simultaneously the section 32 having the actuating yoke 41 is arranged to operate the second section 33. To this end, a gear sector 45 is carried by the sleeve 39 (Fig. 2) of driving section 32 and is mounted thereon to rotate about shaft 36 as hereinafter described. Gear sector 45 is adapted to mesh with and drive a similar gear sector 46 fixed to the sleeve 40, to which the second cage section 33 is secured. Motion imparted to the upper section 32 of the cage is, therefore, through the medium of the gear sectors 45, 46, also imparted to the lower section 33 and in the opposite direction, so that the two sections will close and open about the block simultaneously and substantially equally.

To provide for automatic compensation between the two cage sections and to cause them to adjust themselves so that the lower cage section always contacts with the block or metal coil, the driving gear sector 45, in accordance with the invention, is not mounted directly upon the sleeve 39 of the cage section 32 but is secured thereto through the medium of a compensating spring connection. Although capable of various constructions, in that here shown as an example, (Figs. 1, 2, 9) an upstanding lug 47 is carried by the inner end of the upper cage section 32 and bears against one end of a compression spring 48. The other end of the spring bears against a lug 49 on the gear

sector 45, a set screw 50 being provided for varying the compression of the spring 48. Gear sector 45 is thus arranged to rotate about the sleeve 39 through the spring connection but is not immovably secured to the sleeve. The lug 47 has an extension 51 which abuts gear segment 45 when the cage sections are open, the spring 48 maintaining sufficient pressure to hold the sections open.

For confining the trailing end of the coil and to prevent its whipping about and uncoiling before the block is completely stopped, the cage sections may be limited in opening to a distance slightly more than is necessary to clear the completed coil. To this end, the upper cage section is adapted to abut against a stop 52. The latter may conveniently comprise a projecting member 53 pivotally secured to the mill frame as at 54 by means of a set screw 55 and nut 56 so that the stop may be swung entirely clear of the cage and into inoperative position with facility. If desired the member 52 may be adjustable toward and away from the cage member for which purpose it may be screw threaded.

The invention provides means for automatically lifting the apron 28 (Fig. 19) from the block upon the separation of the cage sections. This may be accomplished by pivoting it outwardly from the block.

Although capable of various constructions as here shown as an example, a link 57 is pivoted to shaft 25 at one end, and has its other end pivoted to a sliding block 58. The latter reciprocates within a fixed guide 59 mounted upon the block frame 6 (Figs. 1, 19).

As the cage section 32 moves upwardly upon opening, the shaft 25, journalled therein, moves in an upward arc about shaft 36 as a centre (Fig. 1). At the same time block 58 slides upwardly in its guide 59, thereby rotating shaft 25 in a direction to swing apron 28, keyed to the shaft, upwardly and outwardly from the block surface about the axis of the shaft.

Means is provided for regulating the pressure of the apron 28 upon the block surface. To this end (Fig. 19), shaft 25, to which the apron arms 26, 27 are secured, is arranged to be turned about its axis on cage section 32 to any position for adjusting the normal relation of the apron to the block surface.

The link 57 is not directly secured to shaft 25 but there is an adjustable connection therebetween. As shown, an adjusting rod or lever 60 is connected to shaft 25 and extends alongside of the link 57. The latter is pivoted on the end of shaft 25, being held in place by a nut 61 and washer 62. For adjusting the angular relation between the link 57 and the rod or lever 60, the former is provided (Fig. 1) with limiting lugs 63, 64, between which the end of adjusting rod 60 is located. This rod 60 is positioned, (Figs. 1, 15), by means of two set screws, 65, 66, threaded through the lugs 63, 64, respectively and which abut against the rod 60, lock nuts being provided for locking the screws in adjusted position.

The invention in its entirety includes means for permitting the removal of the completely wound coil 31 from the block, and also for positively removing such coil, as hereinafter described. To permit the removal of a completely wound coil, the invention provides means for collapsing the block to a smaller diameter after winding of the coil has been completed. In constructions embodying the invention to what is now considered the best advantage, the block surface 12 is formed of a plurality of segments and these segments are arranged to slide inwardly toward the axis, one pair upon the other. Although capable of various constructions, in that here shown as an example, (Figs. 3–6 inc.), the block surface is made of two pairs of segments 67, 68 and 69, 70, the segments 67, 68 of one pair having a larger circumferential area than those of the other pair. The central portion of each segment are thicker at the middle and tapers down towards its sides, to a thin edge, so that the edges of the larger segments 67 and 68 lap over the edges of the smaller segments 69 and 70. The joints between the segments, therefore, are smooth and the segments fit each other accurately.

In order to prevent the joints between the block segments from leaving an impression on the first layer of the strip when coiled about the block, the edges of the segments are so formed as to join along a non-rectilinear line, in the example shown, the line 71, which has the outline of a broad V (Fig. 5).

In order to collapse and expand the block sections, each is provided at its central portion with two bosses or inward extensions 72, one at each end of each section, in each of which is cut a T-shaped slot 73, said slots being cut on a line inclined to the axis of the block. Cooperating with all the sections is a wedge-like member 74 having T-shaped extensions 75 for sliding in the slots 73. Wedge member 74 is mounted to slide on shaft 5 along to the block axis. To this end, the wedge member 74 cooperates loosely with a key 76 extending through said wedge and through slots 77 formed in the hollow shaft 5 (Fig. 5). In order to permit a sufficient amount of play between key 76 and the wedge 74, that is, to permit the key to travel a short distance before moving the wedge, for a purpose presently to appear, key 76 is loosely secured to the wedge. To this end the wedge 74 is provided with slots 78, the key 76 having riders 79 and cotter pins 80 to secure the riders in place. As this wedge member 74

slides in one direction, for example, to the right in Fig. 5, the segments are collapsed and, when it slides to the left, they are expanded. In order that the larger segments 67, 68, when collapsed may overlap the smaller segments 69, 70, the latter are caused to move further inwardly than the former. For this purpose the angle of incline of the slots 73 in the smaller segments is greater than that of the large segments.

In order to secure the block to the shaft 5 so that it may rotate therewith, there are provided end plates 81, 82, which are centrally bored as at 83 to receive the shaft and which are provided with keyways 84, 85, for receiving keys 86, 87. In order to keep the large segments in line radially during expansion and contraction of the block, keys 88 are provided which engage in slots 89, 90 (Fig. 6) formed in the large block sections 67 and 68. Bearing is provided for the smaller sections 69 and 70 in that the surfaces 91 thereof bear on surfaces 92 of the larger sections.

Means are provided for limiting the diameter to which the block may be expanded and for this purpose a limiting stop is provided for the segments. In the embodiment shown, the end plates 81, 82, carry flanges 93, 94, spaced circumferentially and alternately arranged and the block sections are formed with extensions 95, 96 which abut against their cooperating flanges 93, 94.

Means are provided for rotating the shaft 5 on which the block 4 is mounted, at a speed such that the metal strip while being coiled, shall be under tension. This may be accomplished by rotating the block at a peripheral speed slightly greater than that of the rolling mill rolls. Although the shaft 5 may be driven in various ways, it may conveniently be driven through a chain and gear connection from the driving shaft of the rolling mill rolls.

To this end, shaft 5 (Fig. 7) carries a gear 97 which may be driven in any desired manner, for example, by a chain or another gear (not shown).

The thrust of gear 97 is taken up by means of a ball bearing 98 located on shaft 5 between gear 97 and end shaft bearing 99, while gear 97 is prevented from sliding lengthwise of the shaft by the provision of a shoulder 100 formed on the shaft 5.

Means are provided for stopping the rotation of the block after a coil has been completed, without stopping the rolling mill. This may be accomplished by interposing separable connecting means between the gear 97 and the shaft 5. In constructions embodying the invention to what is now considered the best advantage, the connecting means will comprise a clutch. Although capable of various constructions, in that here shown as an example, carried on the gear wheel 97 are a number of spaced clutch plates 101 adapted for frictional engagement with an equal number of plates 102 carried by a sleeve member 103 keyed to the shaft 5 for rotation therewith. Then, when the second set of clutch plates 102 are brought into contact with the first set 101, rotation of the block driving shaft 5 occurs, and when the plates are moved out of contact, rotation ceases.

Means is provided for moving the plates 102 into and out of engagement with plates 101 and for yieldingly holding the plates engaged, whereby the difference in speed between the block surface and the rolling mill rolls may be compensated. To this end, sleeve member 103 and the shaft 5 are provided with cooperating keyways 104 and 105 within which is located a sliding key 106. With this arrangement, sleeve member 103 may have a slight sliding movement on shaft 5 to carry the plates 102 toward or away from plates 101.

For controlling the movement of member 103 there is provided on shaft 5 a ring-shaped sliding member or collar 107 which may be moved toward or away from member 103 as later described. With collar 107 abutting the end of member 103, which, as will appear, is its limiting position to the left in Fig. 7, the plates 101, 102, are just out of engagement. For effecting the engagement of the plates, collar 107 is spring-pressed against member 103. To this end, a lever 108 is pivoted at 109 and is secured at one end to the collar 107, the end of the lever being forked for this purpose. The other end of the lever has a spring 110 secured thereto, which spring is tensioned to frame member 8. Since, in operation, the peripheral speed of the block running idle is greater than that of the mill rolls, this difference is compensated for, when a strip is being coiled, by the yielding engagement of the clutch members just described, which permits enough slip to occur to take care of this condition.

In order to bring the block 4 to a stop, after the clutch has been disconnected, brake means are provided. To this end, mounted on shaft 5 for rotation therewith is a movable brake member or drum 111 surrounding the shaft 5 and supported on the frame 6 is the cooperating brake part 112.

The invention in its entirety includes means for controlling the operation of the clutch and brake and for collapsing and expanding the block. This may be accomplished by common operating means. Although capable of various constructions, in that here shown as an example, the shaft 5 is formed as a hollow shaft and, extending through this hollow shaft 5, is a rod 113 of such a diameter as to permit its sliding back and forth within the hollow shaft 5. Car-

ried on this inner rod 113 is a key 114 which projects, through a pair of diametrically opposed slots 115, 116, cut in the wall of the hollow shaft 5, into a circular recess 117 formed within the collar 107.

This recess 117 is longer than the width of the key 114 so that the latter may have a short idle travel in either direction before abutting against the recess shoulders 119, 120, for a purpose presently to appear.

As now considered to be most advantageous, collar 107, besides controlling the operation of the clutch, also controls the application of the brake. To this end, collar 107 is secured to movable brake member 111 so that when key 114, moved in one direction by sliding rod 113, abuts against shoulder 119 of the recess 117, brake member 111 is moved within brake member 112 to apply the brake and, when key 114 abuts against shoulder 120 in the other direction, brake member 111 is moved out of member 112 to release the brake.

Means have been provided whereby movement of the inner rod 113 also operates the wedge 74 to control the collapsing and expansion of the block 4. To this end the rod 113 is extended centrally into the block 4 and the key 76, controlling the movement of the wedge 74 as above noted, extends transversely through the rod 113, being movable with it.

In order to prevent the coiled strip from being caught between the block segments because of relative movement of the coil and block after the block is collapsed, provision is made whereby collapsing of the block does not occur until after it has ceased rotating. This may be accomplished by timing the application of the clutch and brake and the collapsing operation. In the present construction, the clutch is disengaged first, then the brake is applied and lastly the block is collapsed. To this end, the distance travelled by the key 114 to abut against shoulder 119 for applying the brake is made less than the distance to be travelled by key 76 in slots 78 to move the wedge member 74. And this may be regulated by making the length of slots 78 in which the key 76 moves greater than that of recess 117 in which key 114 operates. Means is also provided for permitting the brake member, when applied, to travel along with the rod 113, as the latter continues its movement for collapsing the block. To this end, outer brake member 112 is arranged to slide along shaft 5 with push rod 113 upon engagement with inner brake member 111.

Means is provided for cushioning the movement of the brake member 112 and for varying the point at which the brake shall be applied. Although capable of various constructions, as here shown as an example, there are formed on the outside of member 112 lugs 121, 122 (Fig. 13), through which extend the threaded ends of rods 123, 124, 125, 126. The other ends of these rods are also threaded and take into tapped holes in rings 127, 128. Coiled between the rings 127, 128 and rings 129, 130, respectively, are compression springs 131, 132. For convenience, the springs 131, 132, are maintained in alignment by the stripper cylinders 133, 134, later described, and around the outer surface of which the springs are coiled.

The rods 123 to 126 inclusive, may be secured to the lugs 121, 122 by nuts 135, 136, and, by altering the effective length of the rods by turning nuts 135, 136, the position of brake member 112 with respect to brake member 111 may be varied, with the result that the point of engagement of the two members may be regulated. In order to regulate the cushioning of the brake member 112 the rings 129, 130, against which the springs 131, 132 press, are provided with set screws 137, 138, respectively, for adjusting their location along the cylinders 133, 134.

Means has been provided for controlling the movement of the rod 113 and for holding it in either of its extreme positions, that is, either with the block stopped and collapsed or expanded and rotating. In structures embodying the invention to what is now considered the best advantage, this is accomplished by fluid pressure. Although capable of various constructions, in that here shown as an example, the inner rod 113 is moved by means of a piston 139 (Fig. 7) operating within a pressure fluid cylinder 140 to which fluid may be admitted or from which fluid may be exhausted as later described.

There is a flexible connection between rod 113 which rotates with shaft 5 and the piston 139 which has a reciprocating motion within cylinder 140. Although capable of various constructions, as here shown, rod 113 carries at its end a bearing member 143 which bears against a bearing plate 144 secured within a hollow cylindrical member 145 bolted to the face of the piston. On the other side of member 143 is a ball thrust bearing 146 which is held in place by means of a nut 147 through which the rod 113 passes and which is threaded into the end of member 145.

Upon movement of piston 139 to the right (Fig. 7), the rod 113 is actuated by bearing plate 144 coming in contact with member 143 and, upon movement of piston 139 to the left (Fig. 7), the rod is actuated by contact of nut 147, through ball bearing 146, with the other side of member 143.

Piston 139 from its contact with rod 113 (through cylindrical member 145 and bearing member 143) acquires a tendency to rotate. There is, therefore, included means for preventing such rotation. To this end, projecting through the cylinder head and secured to piston 139, is one end of a rod 148,

the other end of which is square-sectioned and projects through a square-sectioned opening 149 formed in a square-sectioned guiding member 150 which is carried on an arm 151 secured to the cylinder 140 (Fig. 13).

Since the exposed area of the piston 140 on the face from which rod 148 projects is greater than the area of the face abutting member 145, there results a greater pressure for moving rod 113 in the direction to collapse the block than in the direction for expanding it. The extra pressure for collapsing is advantageous in that it overcomes any tendency of the wedge 74 to stick or oppose collapsing.

The invention in its entirety includes means for removing a wound coil from the block. This may be accomplished by sliding it off the block. Although capable of various constructions, in that here shown as an example, the coil is pushed off the contracted block by means of a ring-like device called a stripper 152, having an inner diameter slightly greater than the expanded diameter of the block. The outer diameter of the stripper 152 is such that a flat surface may be presented to the end of the coil 31 sufficiently large to abut against the edges of all the turns. In order to separate the first coil turn from the block surface, to which it may sometimes adhere, and to remove it unseparated from the rest of the coil, the stripper 152 is provided with a plurality of fingers 153 (Figs. 11, 12) extending slightly below the inner diameter and adapted to contact with the block surface 12. The pressure which the fingers 153 exert upon the block surface may be controlled by means of set screws 154 and springs 155, the fingers being pivoted at one end on pivot pins 156.

There is provided means for moving the stripper and this may conveniently be accomplished by fluid pressure. Although capable of various constructions, in that here shown as an example, cylinders 133, 134 are provided to which fluid may be admitted and exhausted on both sides of the pistons 157, 158, working therein, respectively. These cylinders may be identical and work in unison. The motion of the pistons in response to the pressure fluid is transmitted, by means of piston rods 159, 160, to the stripper 152. To this end, the stripper 152 is provided with lugs 161, 162 through which extends the ends of the piston rods 159, 160, being secured thereto by nuts 163, 164.

Means is provided for limiting the forward movement of the stripper and to this end there are formed on each of the piston rods 159, 160, flanges 165, 166 (Fig. 12), which are adapted to abut against shoulders 167, 168, formed on the inner walls of the cylinder head 169, 170.

Means is provided for receiving the coil upon its removal from the block. To this end, (Fig. 18) there is provided a shelf 171, having a shaped upper surface, preferably concave, to follow the contour of the coil. It is secured to the frame 3 of the mill and located alongside of the block 4. From this shelf, the completed coil may be removed in any desired manner, a downwardly and outwardly extending end slide 172 being provided for facilitating its removal.

In order that the block may be properly aligned to receive a strip emerging from any portion of the rolls, the frame 6 and the whole assembly carried thereby may be moved laterally of the rolling mill and, to this end, rails 173, 174 are provided along which the feet 175 of frame 6 may slide (see Fig. 15).

Means are provided for maintaining the block assembly in the same relative position with respect to the cage members. Although capable of various constructions, as here shown as an example, there is formed on or secured to the upright member 176 of cage supporting member 177 (Fig. 13), a yoke 178 within which is secured a pin 179. Mounted for pivotal movement about this pin 179 is a yoke 180 which is adapted to take into one of a plurality of slots 181 cut in the upstanding edge 182 of a plate 183 secured to the frame 6.

As the frame 6 is moved laterally along the rails 173, 174, one of the slots 181 is positioned to receive the yoke 180, thus providing a support from the upright member 176 of the cage support 177 to the block assembly frame.

The operation of the above described apparatus may be reviewed as follows:

The strip 1 emerges from the mill 3 between guiding members 9, and is guided about the positively held expanded block surface 12 by means of the rollers 23 and 13 in the cage sections 32, 33, which are closed down upon the block. In order to start the second layer the strip is guided by means of roller 30 on guiding apron 28. As soon as the strip has built up a predetermined number of turns the cage sections are opened either by hand or under the control of cylinder 43, the winding continuing until the strip is fully coiled.

As soon as the trailing end of the strip emerges from the mill the push rod 113 is moved to the right as viewed in Fig. 7, disconnecting the clutch plates 102 from plates 101 thereby disconnecting the driving means from the block shaft 5. Continued movement of rod 113 carries key 114 against shoulders 119 of member 107. Still further movement of the rod 113 carries member 107 further to the right, and with it lever 108, thus relieving the pressure on the clutch plates which thereupon disengage. This continued movement causes the brake member 111 to engage brake member 112 thereby stopping the rotation of shaft 5. Push rod 113 now moves further to the right carrying both

brake members with it and causes key 76 to abut against the end of slot 78 in wedge member 74, carrying the extensions 75 of the latter along T-slot 73, thus collapsing the block.

The coil 31 is now removed from the collapsed block onto shelf 171 by the movement of stripper 152, from which shelf it may then be carried away.

As soon as the stripper 152 has removed the coil and started to return, the push rod is moved to the left (Fig. 7), expanding the block. Continued movement separates the brake members and causes the clutch plates 101, 102, again to engage, rotating shaft 5 and the block 4. The cage sections 32, 33, are then closed about the block ready for a new strip.

The invention in its entirety includes means for controlling the above-described operations remotely and for effecting an automatic cycle thereof. This may conveniently be accomplished by actuating the various parts by fluid pressure units and controlling these units by automatically controlled valves, for example, by means of electric circuits.

In the embodiment here illustrated as an example, pivotally secured to upper cage member 32 is a yoke-like member 41 to the central part of which is secured the outer end of a piston rod 42 on a piston 184 working in fluid pressure cylinder 43. In order to cushion the closing stroke of the cage, piston rod 42 is extended beyond piston 184, as at 186. Coiled about this extension is a compression spring 185 confined between cylinder wall 87 and a cap 188. The cushioning pressure of spring 185 may be varied by adjusting the position of cap 188 by means of nuts 189, 190 on extension 186. Cylinder 43, for convenience, is mounted on an extension frame member 191 by means of brackets 192.

Connected with the respective ends of cylinder 43 are pipes 193, 194 (Fig. 20). These pipes lead to the valve chamber of a control valve unit such, for example, as the valve unit shown and described in my U. S. Patent 1,849,044, and more particularly shown in Figs. 17 and 18, thereof.

Such a control valve unit is illustrated diagrammatically in Fig. 20, herein. Reciprocating in a valve chamber 195*a* is a D-slide valve 195. This chamber is connected with a source of pressure fluid by pipe 195*b* and with exhaust by pipe 195*c*. When the valve is in the position of Fig. 20, pipe 194 is connected with the source and pipe 193 with exhaust, whereby piston 184 is moved upwardly, as there viewed. When valve 195 is moved to the right, these conditions are reversed and the piston reverses.

Pipes 196, 197 lead from the respective ends of stripper cylinders 133, 134 to a similar valve unit 198. Since the main block-controlling fluid-pressure unit and the stripper units operate in unison, they may conveniently be controlled by a common valve. To this end, branch pipes 199, 200 connect the respective ends of cylinder 140 with control valve 198.

The movement of the D-slide valves may conveniently be controlled by solenoid-operated pilot valves such, for example, as shown and described in said patent. In Fig. 21 herein, the coils for such solenoids are indicated at 201 and 202. As is more fully described in said patent, an energized solenoid results in a movement of the D-valve to the right, as viewed in Fig. 20 herein, and in Figs. 17 and 18 of said patent. A deenergized solenoid results in an opposite movement of the D-valve.

In the embodiment here illustrated as an example, the coils of the solenoid-operated valves are included in a D. C. system. The various circuits of this D. C. system are controlled by suitable contactors or relays, each comprising a single lift solenoid and a contact bar having various contact terminals. The coils for these relays are included in an A. C. system the circuits of which are controlled by make-and-break devices.

Except as hereinafter noted, these make-and-break devices are machine operated switches. Any suitable switch construction may be used to obtain the conditions hereinafter described. Fig. 10 shows, in a general way, a switch comprising a box 277 for enclosing a pair of contacts. From the box extends an actuating lever 204 having a roller 205 at its forward end. This switch is operated by a cam 206 carried by one of the moving parts, the engagement of the cam actuating lever 204 to operate the switch. Such a type of switch is more fully disclosed in my U. S. Patent 1,768,866. As appears hereinafter, some of the switches are normally closed and are opened by the operation referred to, while others are normally open and are operated for closing, it being apparent that the desired effect may be obtained by the arrangement of the contacts and actuating member. In the following description it is unnecessary to refer specifically to the several switch-operating elements or to the mechanical location of the switches. Given the desired circuit conditions and the moving part involved, the switch and its cam or the like, may be readily arranged in suitable manner.

Referring more particularly to Figs. 20 and 21, in order to place the electric control means in running condition, for instance at the start of a day's run, a hand switch 251 is closed to connect the system with the main lines. Closing of this switch completes a circuit for raising a contactor 252. This circuit extends from A. C. line 252*a* through

the coil of contactor 252, conductor 253, switch 251, and conductor 254, to A. C. line 252*b*. By the lift of this contactor 252, A. C. busses 258 and 263 are connected up with the respective A. C. lines 252*a*, 252*b* through the upper contacts of the contactor. Similarly, D. C. busses 273 and 270 are connected up with D. C. lines 252*d*, 252*c*. Contactor 252 remains up through the automatic running period i. e., as long as switch 251 remains closed.

Each automatic cycle is initiated by the closing of a control switch. In the present embodiment, this is accomplished by a hand switch and the cycle is started by the operator at the end of a coiling operation. It is assumed that the machine is running, the cage open, and a coil nearing completion. As the trailing end of the strip emerges from the rolling mill the operator momentarily closes hand switch 255.

The closing of this switch 255 results in the stopping of the block and the removal of the coil. To this end, the operation of switch 255 closes a circuit extending from A. C. bus 258 through conductor 256*a*, the coil of contactor 256, conductor 259, switch 260, which is held closed when, and only when, the stripper unit is fully retracted, conductor 261, switch 255 and conductor 262 to A. C. bus 263. This circuit energizes the coil of contactor 256 which is thus raised. Since control switch 255 is only momentarily closed, there is provided a holding circuit for the contactor, this circuit extending from A. C. bus 258 through conductor 256*a*, the coil of contactor 256, conductor 256*b*, upper contacts of raised contactor 256, conductor 256*c*, switch 264, which is now and normally closed, and conductor 265 to A. C. bus 263.

This lift of contactor 256 closes a circuit for coil 202 of valve unit 198, this circuit extending from D. C. bus 270 through conductor 270*a*, upper contacts of contactor 256, conductors 271, 271*a*, valve coil 202, and conductor 272 to D. C. bus 273. By this energizing of coil 202 valve 198 moves to the position of Fig. 20, admitting pressure fluid to the rear ends of main cylinder 140 and stripper cylinders 133, 134 and connecting the other ends of these cylinders to exhaust. By the consequent forward movement of piston 139, push rod 113 is advanced to throw out the clutch, apply the brake, and collapse the block, as above described. Also, by the advance of pistons 157, 158 stripper 152 is advanced to remove the coil.

Completion of the above operations effects an automatic reversal of the parts by breaking the circuit for coil 202. As here shown as an example, normally closed switch 264 is opened at the end of the stripper advance stroke by a cam 206 carried on the stripper unit (Figs. 10, 15, 21). Opening of this switch breaks the holding circuit for contactor 256 which drops, thus breaking the circuit for valve coil 202. As a result, valve 198 moves to the left, as viewed in Fig. 20, and reverses the pressure and exhaust connections for the main and stripper cylinders. The consequent reverse movement of pistons 157, 158 withdraws the stripper. Similarly, the reversal of piston 139 withdraws push rod 113, thereby expanding the block, releasing the brake and throwing in the clutch, as above described.

The completion of this withdrawal operation effects an automatic closing of the cage for the next strip. To this end, as here shown as an example, a normally open switch 277 is momentarily closed by cam 206 at the end of the withdrawal stroke of the stripper. This closes a circuit for a contactor 278, the circuit extending from A. C. bus 258 through conductor 278*a*, the coil of contactor 278, conductor 278*b*, lower contacts of contactor 256 (now down), conductor 280, switch 277 and conductor 279 to A. C. bus 263. Since switch 277 is only momentarily closed there is provided a holding circuit for the contactor. This circuit extends from A. C. bus 258 through conductor 278*a*, the coil of contactor 278, conductor 278*c*, upper contacts of contactor 278, conductor 278*d*, upper contacts of contactor 257, which is raised as later described, and conductor 257*e to* A. C. bus 263.

This lift of contactor 278 closes a circuit for coil 201 of valve unit 195, the circuit extending from D. C. bus 273 through conductor 281, valve coil 201, conductor 278*f*, upper contacts of contactor 278, and conductor 278*e* to D. C. bus 270. This energizing of coil 201 causes valve 195 to move to the right, as viewed in Fig. 20, connecting pipe 193 with pressure fluid and pipe 194 with exhaust. As a result, piston 184 moves down to close the cage as above described.

At the end of this closing stroke of the cage, normally closed switch 268 is opened, thus breaking the holding circuit (hereinafter described) for contactor 257, which drops. This, in turn, breaks the holding circuit for contactor 278 which also drops.

As contactor 278 in up position controlled the energizing circuit for valve coil 201, there is provided a substitute circuit so that the coil will remain energized and the cage closed after contactor 278 drops. This circuit extends from D. C. bus 273 through conductor 281, coil 201, lower contacts of contactor 257, which has just dropped, and conductor 278*g*, 278*e* to D. C. bus 270.

The apparatus is now ready for the next strip and as soon as the cage has closed, the operator may insert a new strip in the rolling mill.

The next step in the automatic cycle of the present embodiment is the opening of the cage and this may conveniently be controlled by the building up of the coil. As here shown

as an example, secured to cage arm 35 is a cam 283 (Fig. 13) arranged to close more or less momentarily a normally open switch 282 when the cage arm has been moved upwardly by the build up of the coil a distance dependent on a predetermined number of coil turns. This closes a circuit for lifting contactor 257, the circuit extending from A. C. bus 258 through conductor 257*a*, coil of contactor 257, conductors 266, 285, switch 282, and conductor 284 to A. C. bus 263. There is provided a holding circuit for contactor 257 to take effect after switch 282 re-opens. This circuit extends from A. C. bus 258 through conductor 257*a*, coil of contactor 257, conductor 257*b*, upper contacts of contactor 257, conductor 267, normally closed switch 268, and conductor 269 to A. C. bus 263. Switch 268 is open at this point but closes upon the opening of the cage, presently described, and switch 282 is arranged to remain closed until switch 268 closes.

The lift of contactor 257 breaks the substitute circuit for coil 201 of valve 195. This causes valve 195 to move to the position of Fig. 20, reversing the connections of cylinder 43. As a result, piston 184 moves upwardly to open the cage to permit the further growth of the coil.

This completes one automatic cycle, subsequent cycles being identical and continuing as long as switch 251 remains open and new strips are supplied.

At the end of a run, hand switch 251 is re-opened, thus breaking the circuit for contactor 252 which drops, thus disconnecting the busses and rendering the automatic system dead.

In the above description, contactor 257 was referred to as being in up position at the start of the cycle, having been raised near the end of the previous cycle. This is true for all cycles of a run, once the run is started. For the first cycle of a run, however, contactor 257 will not be up because, following its lift at the end of the last cycle of the previous run, it will drop when the busses are disconnected. There is provided, therefore, substitute means for raising contactor 257 at the start of a run. To this end, as here shown, as an example, the closing of switch 255, above referred to, closes a circuit for raising contactor 257. This circuit extends from A. C. bus 258 through conductor 257*a*, the coil of contactor 257, conductor 266, switch 255, and conductor 262 to A. C. bus 263. Contactor 257, thus raised, is held up by the holding circuit above described. On all subsequent cycles of the run, contactor 257 is already up when switch 255 is closed so that this substitute circuit is ineffective until again needed at the start of another run.

The invention in its entirety includes means for manual operation of the remote control. To this end, hand switches and substitute circuits are provided for controlling the two valve units 195, 198. As here shown as an example, for manual control, switch 251, is opened to cause contactor 252 to drop and nullify the automatic system. To advance the push rod 113 and the stripper, the operator closes hand switch 286. This completes a circuit extending from D. C. line 252*d*, through lower contacts of contactor 252, D. C. bus 273, conductor 272, valve coil 202, conductor 271*a*, switch 286, conductor 287 lower contacts of contactor 252 to D. C. line 252*c*. This energizes coil 202 to move valve 198 to the right, as viewed in Fig. 20, thereby to cause advance of push rod 113 and advance of the stripper, as above described. The push rod and stripper are reversed by opening switch 286 to de-energize coil 202.

To close the cage, the operator closes hand switch 288. This completes a circuit for energizing valve coil 201. The circuit extending from D. C. line 252*c* through lower contacts of contactor 252, conductor 287, switch 288, conductor 288*a*, valve coil 201, conductor 281, D. C. bus 273 and lower contacts of contactor 252 to D. C. line 252*d*. This energizes coil 201 and so moves valve 195 to the right, as viewed in Fig. 20, causing the cage to close, as above described. To open the cage, the operator opens switch 288 to de-energize coil 201.

Thus all the operations are effected by closing and opening the two hand switches 286, 288.

What is claimed is:

1. In a blocking machine, and in combination, a rotating block for coiling metal strip emerging from a rolling mill, guide means for directing said strip about said block, said means comprising block-embracing arms, said arms being pivotally associated, means for swinging one of said arms about its pivot, and means associated with said first arm and controlled thereby for moving said second arm in synchronism therewith, said means including a compensating spring connection between said first arm and said second arm.

2. In a blocking machine, and in combination, a block for coiling metal strip emerging from a rolling mill, means to rotate said block, a ring-like device having an inner periphery sufficiently large to fit over the block, a plurality of spring-pressed fingers carried by said device and projecting within the inner diameter, means to move said device along the surface of the block whereby the fingers engage the block surface to remove the coil therefrom, and means for receiving the coil upon removal from the block.

3. In a blocking machine, and in combination, a block for coiling metal strip emerging from a rolling mill, means to rotate said block, a ring-like device having an

inner periphery sufficiently large to fit over the block, a plurality of spring-pressed fingers carried by said device and projecting within the ring, means to move said device along the surface of the block whereby the fingers engage the block to remove the coil therefrom, and a shelf mounted alongside of said block for receiving the coil as it is removed therefrom.

4. In a blocking machine, and in combination, a block about which a metal strip may be coiled, said block being formed of a plurality of collapsible segments, means to collapse said block, means for supplying said strip, driving means for said block actuated by and in synchronism with said supplying means, guide means for directing the strip about the surface of the block comprising a block-embracing device, said device being provided with a plurality of spring-pressed rollers for causing the strip to move easily about the block, and a freely moving pivoted apron resting against the surface of the block opposite said guide means for assisting in maintaining said strip in contact with said block.

5. In a blocking machine, and in combination, a block about which a metal strip may be coiled, means for supplying said strip, driving means for said block actuated by and in synchronism with said supplying means, guide means for directing the strip about the surface of the block comprising a block-embracing device, said device having block-embracing members with tangentially extending substantially parallel arms, means for pivotally mounting said arms, power-operated means for moving said members toward and away from said block comprising a piston rod, means to secure said piston rod to said members, a piston on the end of said rod, a cylinder in which the piston works, a valve for admitting pressure fluid to and permitting it to exhaust from said cylinder to move said piston, and means for operating said valve.

6. In a blocking machine, and in combination, a block for coiling a strip emerging from a rolling mill, rotating means therefor, means for connecting and disconnecting said rotating means and said block, means for stopping the rotation of said block, means for causing said block to expand and collapse, and means for causing the disconnection of said rotating means from said block, the operation of said stopping means and the operation of the collapsing means in timed relation.

7. In a blocking machine, and in combination, a block for receiving a metal strip as it emerges from a rolling mill, a shaft therefor, means for varying the diameter of said block, means for driving said shaft from said mill, clutch means for connecting said shaft and said driving means, brake means for said shaft, and common actuating means for said block diameter-varying means, said clutch means and said brake means whereby said means are operated in timed relation.

8. In a blocking machine, and in combination, a block about which a metal strip may be coiled, said block being formed of a plurality of collapsible segments, means to collapse said block, a rolling mill for supplying said strip, driving means for said block actuated by and in synchronism with said rolling mill, guide means for directing said strip about the surface of the block, a clutch between said driving means and said block, a brake for said block, and common actuating means for said clutch, brake and block-collapsing means.

9. In a blocking machine, and in combination, a rotating block for coiling strip material, said block including a plurality of circumferentially arranged segments, the lines of joining between adjacent segments being angular, and means for moving all of said segments radially with respect to the axis of rotation of the block for expanding and contracting said block surface.

10. In a blocking machine, and in combination, a rotating block for coiling strip material, said block having a smooth segmental surface, the lines of joining between adjacent segments being non-rectilinear, means for moving said segments for expanding and contracting said block surface and for holding said segments expanded under maintained power, a pressure fluid cylinder for controlling said moving and holding means, remote control means for said cylinder, brake means for stopping the rotation of said block, and common control means for said segment-moving means and said brake means, said control means causing the operation of said brake means to stop said block before the operation of said segment-moving means to collapse said block.

11. In a blocking machine, and in combination, a rotating block for coiling a strip, means for guiding said strip about said block, means to move said guiding means toward and away from said block, means for stopping the rotation of said block, means for collapsing and expanding said block, means for removing a completed coil from said block, and means for causing said moving, stopping, collapsing and removing means to operate through a predetermined cycle.

12. In a blocking machine, and in combination, a block for coiling strip material, said block having a plurality of cooperating circumferentially arranged segments, means for moving said segments toward and from the block center for expanding and contracting the block surface, the lines of joining between adjacent segments being angular and approximately broad V's, and the surface of

the block being smooth when the segments are expanded.

13. In a blocking machine, and in combination, a block for coiling strip material, said block having a plurality of overlapping segments, means for moving said segments for expanding and contracting the block surface, said means including a member movable within and axially of the segments and having means engaging the segments and interlocking with the segments radially and rotatably, said engaging means having axially inclined surfaces engaging axially inclined surfaces on said segments.

14. In a blocking machine, and in combination, a block for coiling strip material, means for guiding the strip around the block, said means including block-engaging members, a fluid pressure actuated device for simultaneously moving said members to engage with or separate from the block surface, an apron also arranged to guide the strip on the block and disposed between the block-engaging members, means whereby the movement of the block-engaging members is communicated to the apron, a stripping element for removing a coil from said block, and means controlled by said stripping element for setting in motion said fluid pressure actuated device.

15. In a blocking machine, and in combination, a block for coiling strip material, means for collapsing and expanding the block, said means including a rod extending axially through the block, a power-operated piston arranged to act on the rod, a connection between piston and rod coupling them axially but not rotatably.

16. In a blocking machine, and in combination, a rotary block for coiling strip material, a clutch and a brake for said block, expanding and contracting means for the block, and means extending through the clutch, brake and expanding and contracting means and adapted to operate the same in predetermined progression.

17. In a blocking machine, and in combination, a rotary block for coiling strip material, a clutch and a brake for said block, expanding and contracting means for the block, and a rod extending through the clutch, brake and expanding and contracting means and adapted to operate the same through connections having time lags of different amounts whereby operation occurs in predetermined progression.

18. In a blocking machine, and in combination, a block for coiling strip material, said block having a plurality of segments, means for moving said segments for expanding and contracting the block surface, said means including a member movable within and axially of the segments and having means engaging the segments and interlocking with the segments radially and rotatably said engaging means having axially inclined surfaces engaging axially inclined surfaces on the segments, the inclinations of some of said surfaces being greater than others to cause collapse of some of said segments before others.

19. In a blocking machine, and in combination, a block for coiling strip material comprising segments adapted to be moved radially, some of said segments moving inwardly more rapidly than others, said first segments bearing against the others during radial movement to be guided thereby, and means for guiding said other segments radially.

20. In a blocking machine and in combination, a rotating block for coiling strip metal, guide means for directing the strip about the block comprising a sectional cage embracing the block and carrying a plurality of spring-pressed strip-engaging rollers, and means including a fluid pressure unit actuated by said machine for opening and closing the sections of said cage.

21. In a blocking machine and in combination, a rotating block for coiling strip metal, guide means for directing the strip about the block comprising a sectional cage embracing the block and carrying a plurality of spring-pressed strip-engaging rollers, means including a pivoted fluid pressure unit for separating the sections of said cage, and stop means for limiting the separating movement.

22. In a blocking machine and in combination, a rotating block for coiling strip metal, a cage comprising two pivotally-mounted jaw-like arms, guide rollers carried by said arms, and means including a fluid pressure unit actuated by operation of said machine for moving said arms on their pivots, thereby to cause the guide rollers to approach or recede from said block.

23. In a blocking machine, and in combination with a rolling mill, a rotary coiling block, means for driving said block from the rolling mill, a clutch connection in said driving means, brake means for stopping rotation of the block, an actuating element for said clutch connection and brake means, and mechanism operable by movement of said actuating element in one direction for returning it to initial position.

24. In a blocking machine, and in combination with a rolling mill, a rotating coiling block, means for driving said block from the rolling mill, a clutch connection in said driving means, brake means for stopping rotation of the block, means for removing the coil from the block, a common actuating element for said clutch connection and said braking means and said removing means, and mechanism operable by movement of said actuating element in one direction for returning it to initial position.

25. In a blocking machine, and in com-

bination, a rotary collapsible block for coiling strip metal, means, including a clutch connection, for rotating said block, a brake for stopping rotation of said block, means for causing collapse of said block for removal of the coil, and common means for controlling the operation of said clutch, brake, and collapsing means.

26. In a blocking machine, and in combination, a rotary collapsible block for coiling strip metal, brake means for stopping rotation of the block, means for collapsing the block, and operating means for said brake means and collapsing means, said operating means being timed to actuate said brake means first and thereafter cooperating with said block collapsing means to cause collapse of the block.

27. In a blocking machine, and in combination, a rotary collapsible block for coiling strip metal, means, including a clutch connection, for rotating said block, brake means for stopping rotation of the block, means for collapsing the block, and means for effecting operation of said clutch, brake means, and collapsing means in the order named.

28. In a blocking machine, and in combination, a rotary collapsible block for coiling strip metal, means, including a clutch connection, for rotating said block, brake means for stopping rotation of the block, means for collapsing the block, a control element, connections between said control element and said clutch, brake means and collapsing means respectively for causing respective operation of the latter upon movement of the control element, and a fluid pressure unit for moving said control element.

29. In a blocking machine, and in combination, a rotary collapsible block for coiling strip metal, means for stopping rotation of the block, means for collapsing the block, means for stripping the coil from the collapsed block, a shelf adjacent the block and having a concave surface for receiving the coil and mechanism called into action by operation of said stopping, collapsing and stripping means for returning said means to initial position.

30. In a blocking machine, and in combination, a rotary block for coiling strip material, strip guiding means including a cage movable toward and away from the block, stripper means for stripping a coil from the block, a control switch, and means dependent on the operation of said control switch for causing said stripper and said cage to move through a predetermined cycle.

31. In a blocking machine, and in combination, a rotary collapsible block for coiling strip material, block-controlling means, strip-guiding means including a cage movable toward and away from the block, cage-moving means, stripper means for stripping a coil from the block, a control switch, and means dependent on the operation of said control switch for causing said block-controlling means, said cage-moving means and said stripper means to operate through a predetermined cycle.

32. In a blocking machine, and in combination, a rotary collapsible block for coiling strip material, block-controlling means, strip-guiding means including a cage movable toward and away from the block, cage-moving means, stripper means for stripping a coil from the block, a switch, means dependent on the operation of said switch for causing the block-controlling means to collapse and stop the block and the stripper means to advance, means controlled by the advance stroke of the stripper for causing the stripper to withdraw and the block-controlling means to expand and start the block, means controlled by the withdrawal of the stripper for causing the cage-moving means to close the cage, and means dependent on a predetermined growth of the next coil for causing the cage-moving means to open the cage.

33. In a blocking machine, and in combination, a rotary block for coiling strip material, strip-guiding means including a cage movable toward and away from said block, a reciprocating stripper for stripping a coil from the block, and means controlled by the return stroke of said stripper for closing said cage.

34. In a blocking machine, and in combination, a rotary block for coiling strip material, strip-guiding means including a cage movable toward and away from the block, a reciprocating stripper for stripping a coil from the block, a control switch, means dependent on the operation of said control switch for advancing said stripper and withdrawing the same, means controlled by the withdrawal of the stripper for closing said cage, and means controlled by a predetermined growth of the next coil for opening said cage.

35. In a blocking machine, and in combination, a rotary collapsible block for coiling strip material, strip-guiding means including a cage movable toward and away from the block, a reciprocating stripper for stripping a coil from the block, a control switch, means dependent on the operation of said control switch for stopping and collapsing said block, advancing said stripper, withdrawing the stripper, expanding and starting said block and closing said cage, a second switch, and means dependent on the operation of said second switch for opening said cage.

36. In a blocking machine, and in combination, a rotary block for coiling strip material, strip-guiding means including a cage movable toward and away from the block, stripper means for removing a coil from the block, a fluid pressure unit for operating said

cage, a fluid pressure unit for operating said stripper, means including solenoid-operated valves for controlling said fluid pressure units, circuits including machine-operated switches for controlling said solenoids, and substitute circuits for said solenoids including hand-operated switches.

37. In a blocking machine, and in combination, a rotary collapsible block for coiling strip material, strip-guiding means associated with the block, a clutch and a brake for said block, means for collapsing and expanding the block, a reciprocating stripper for stripping a coil from the block, a common actuator for said clutch, brake and block-collapsing-and-expanding means, fluid pressure units for operating said common actuator and said stripper, and common remote control means for said fluid pressure units.

In testimony whereof, I have hereunto set my hand.

DAVID L. SUMMEY.