April 14, 1931. A. H. HEDLY 1,800,938

MACHINE FOR MAKING PRINTERS' LEADS, SLUGS, AND RULES

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Fig. 1

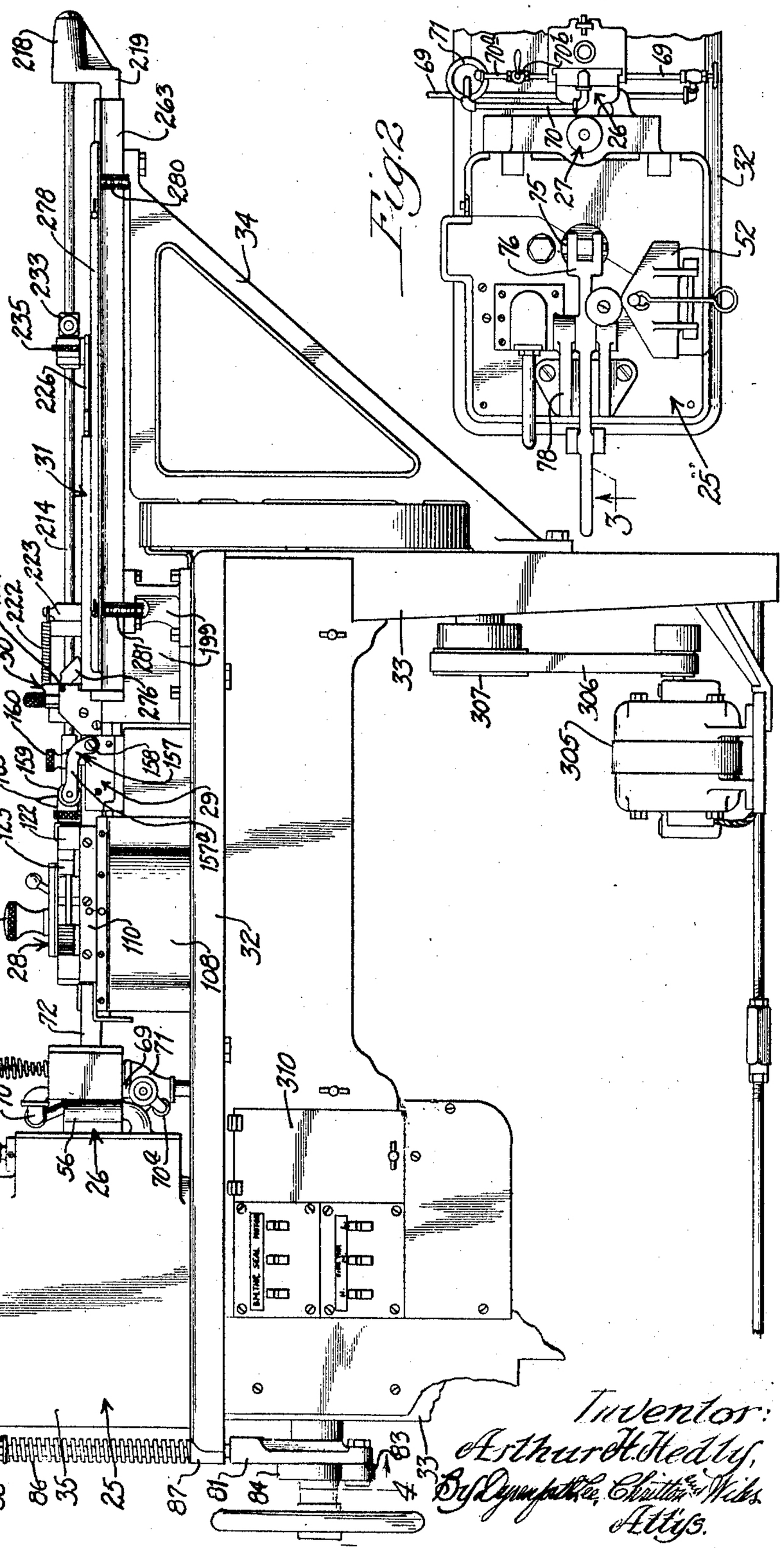

Fig. 2

Inventor:
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MACHINE FOR MAKING PRINTERS' LEADS, SLUGS, AND RULES

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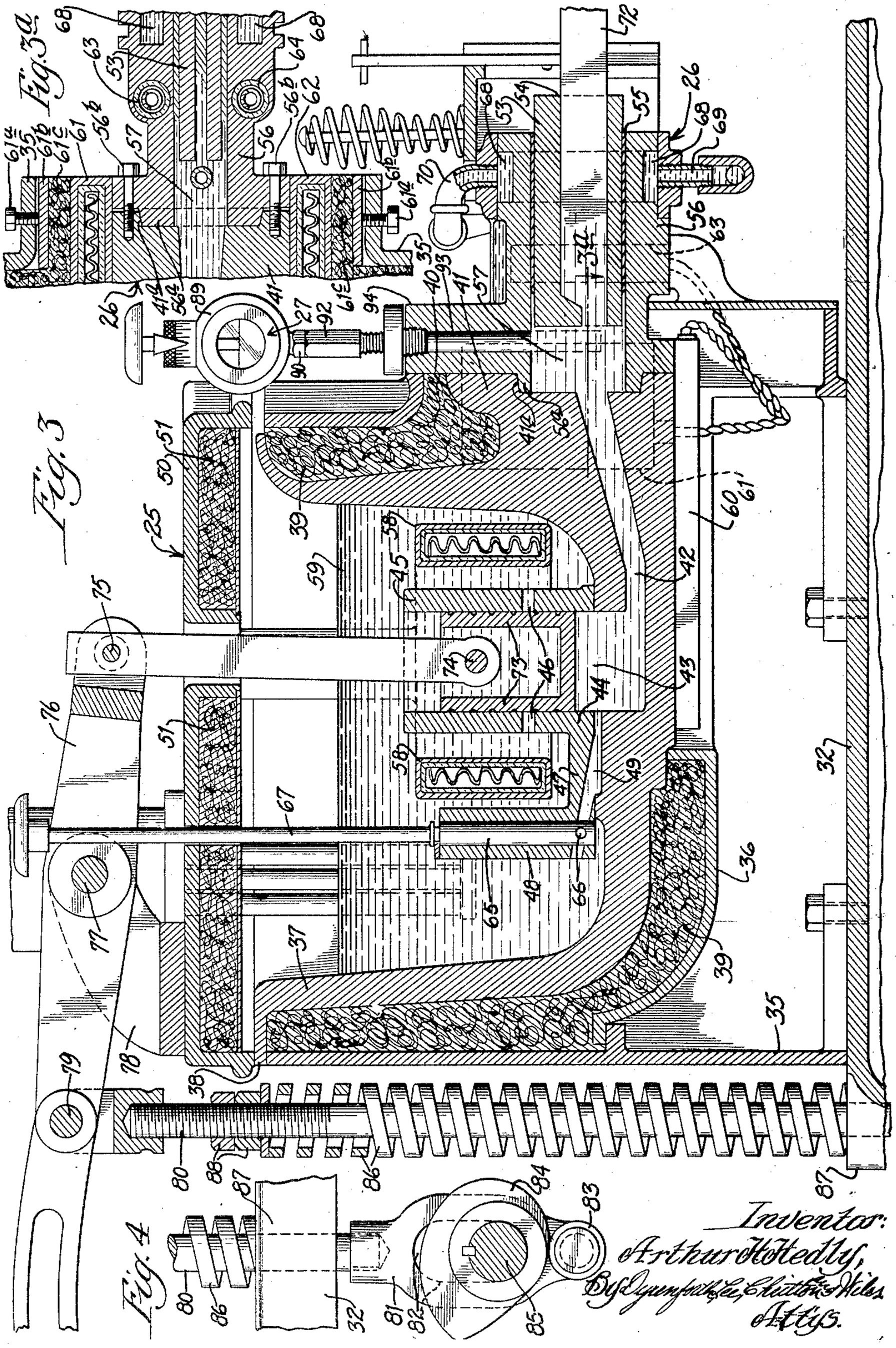

Fig. 3a

Fig. 3

Fig. 4

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April 14, 1931. A. H. HEDLY 1,800,938

MACHINE FOR MAKING PRINTERS' LEADS, SLUGS, AND RULES

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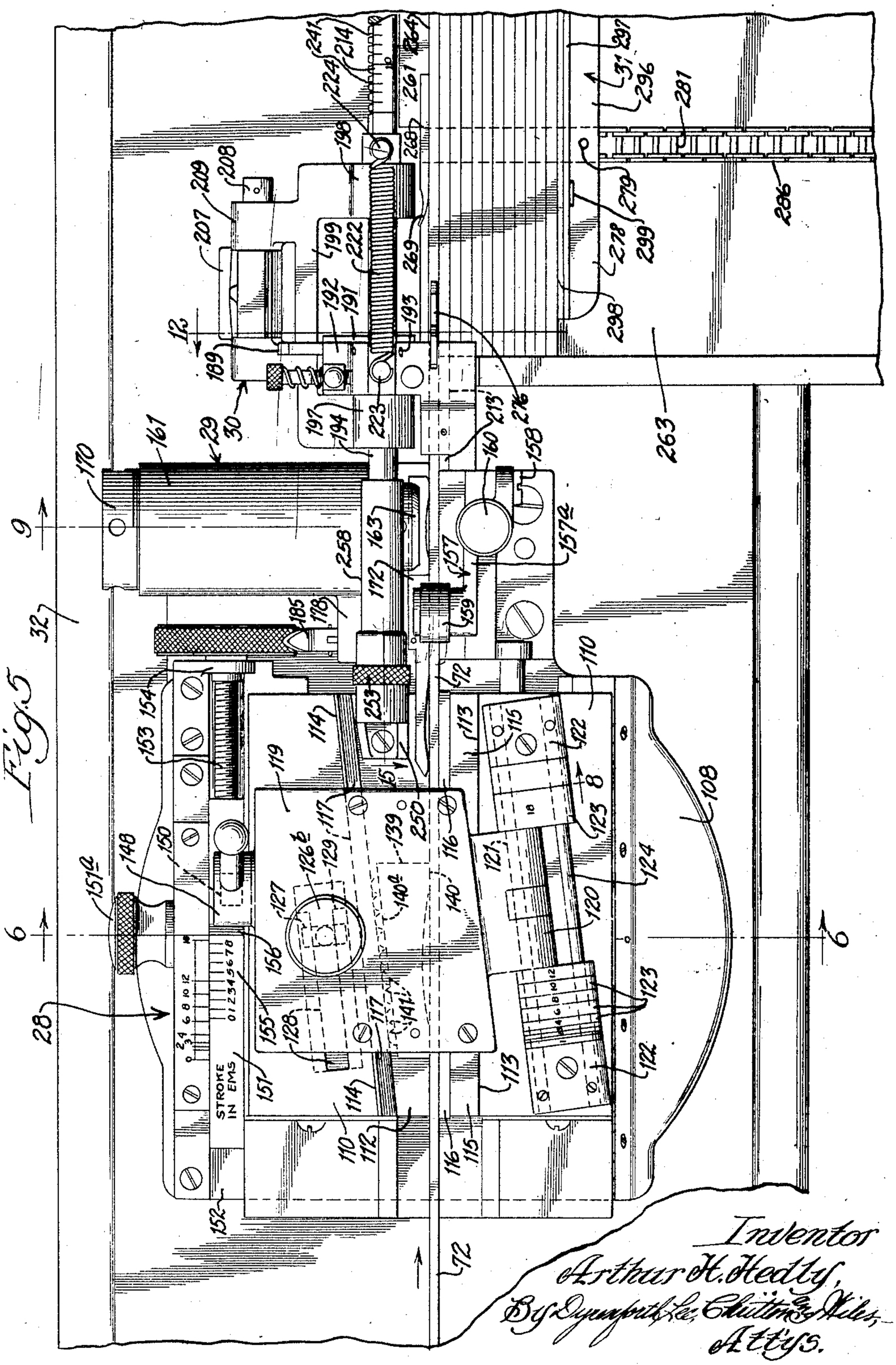

April 14, 1931. A. H. HEDLY 1,800,938

MACHINE FOR MAKING PRINTERS' LEADS, SLUGS, AND RULES

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Fig. 6

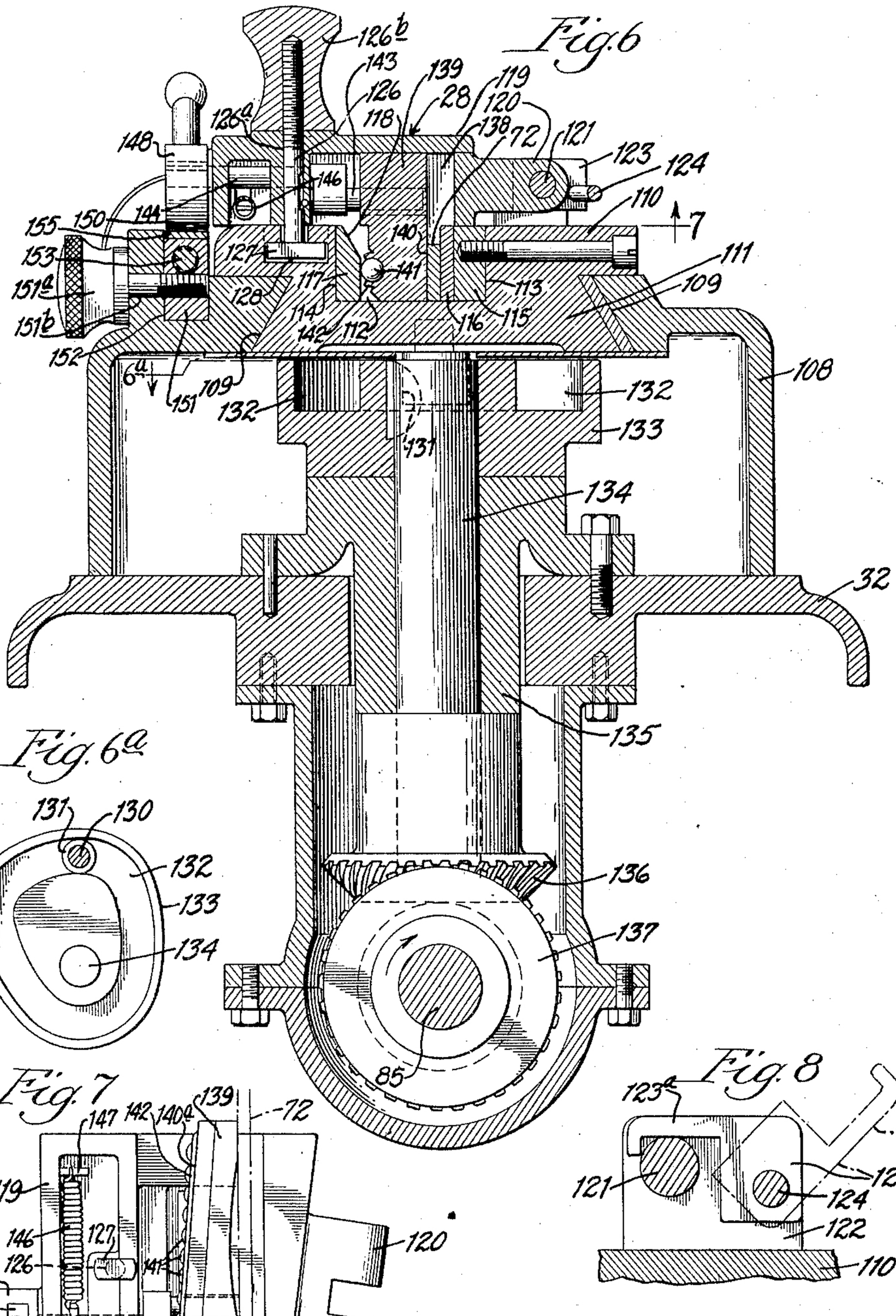

Fig. 6a

Fig. 7

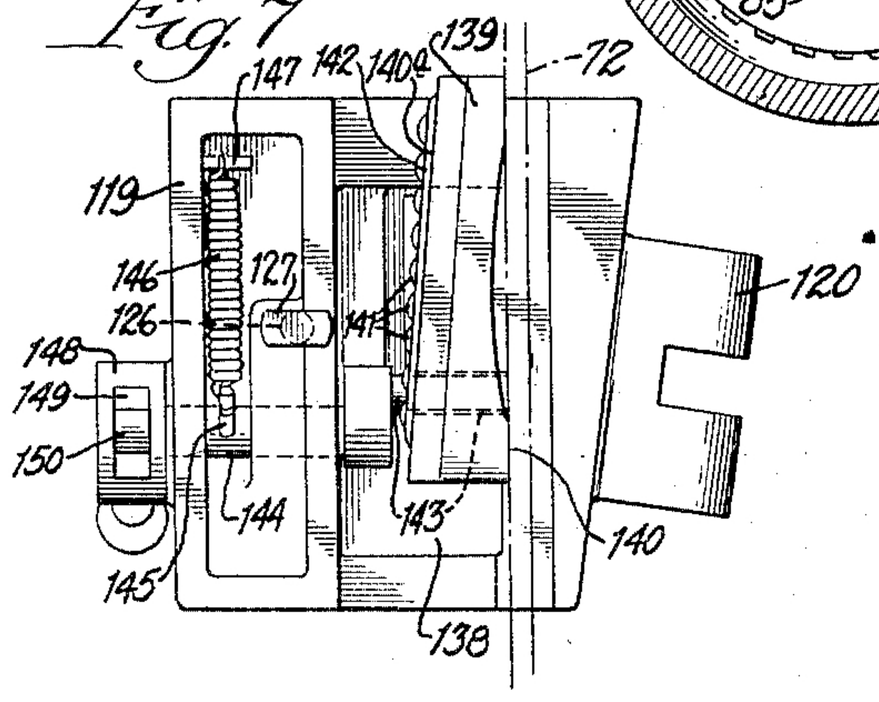

Fig. 8

Inventor:
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MACHINE FOR MAKING PRINTERS' LEADS, SLUGS, AND RULES

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Fig. 9

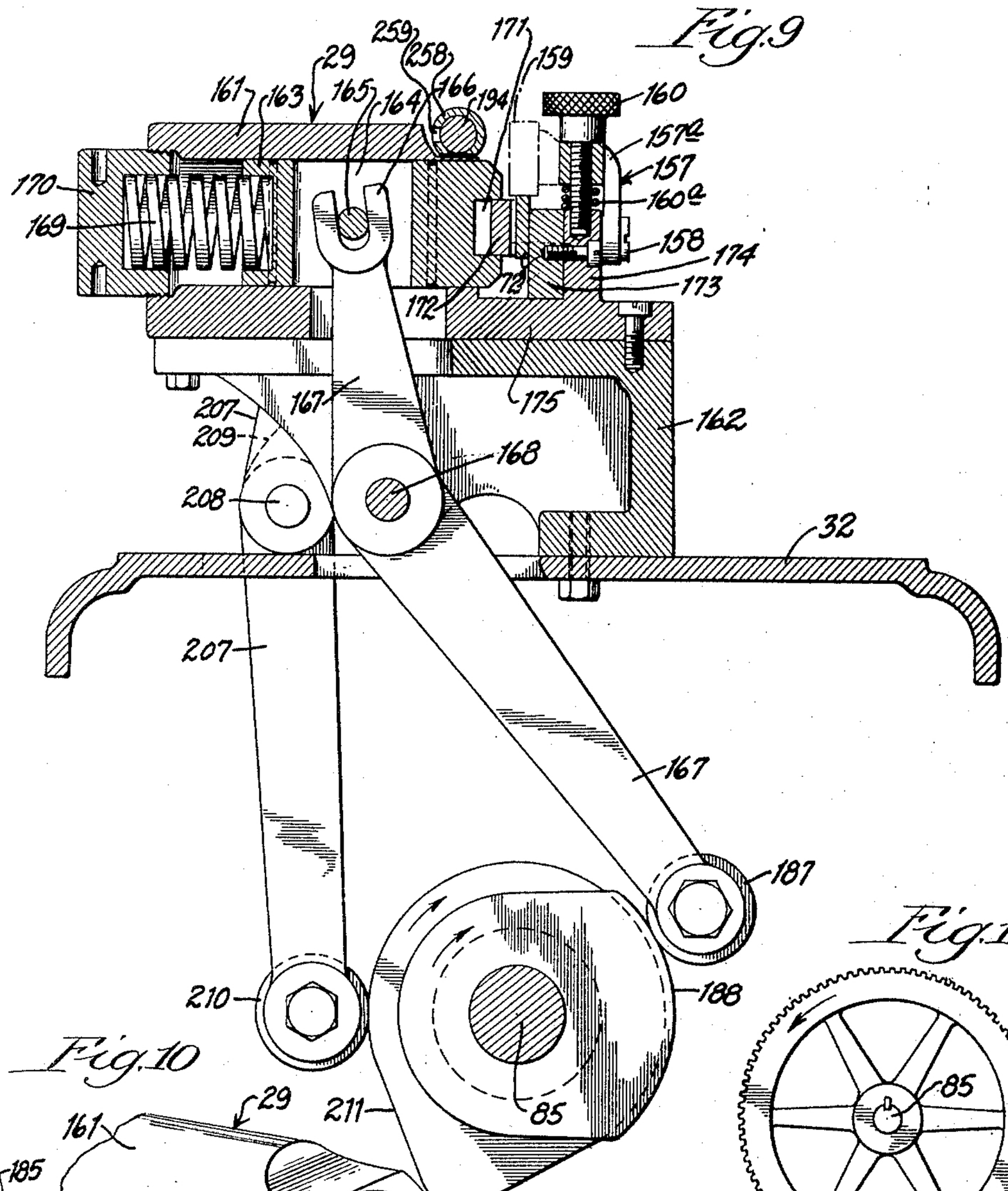
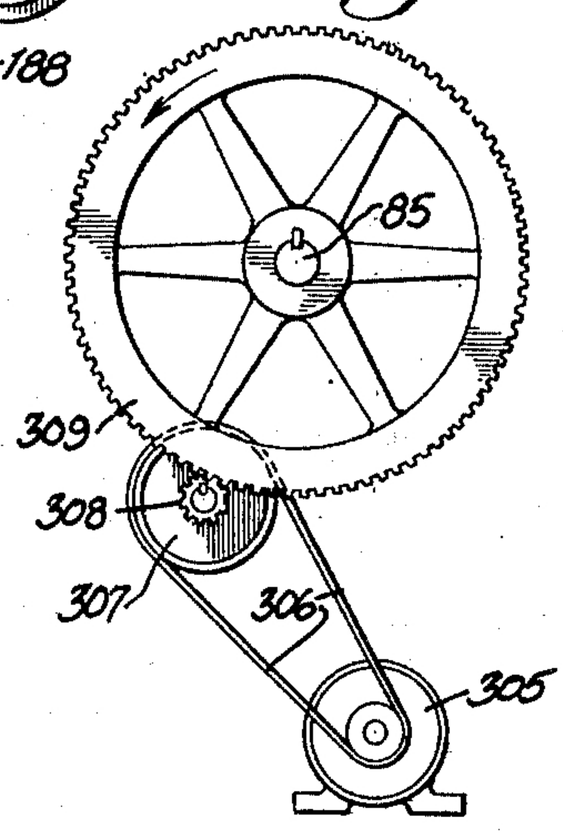


Fig. 10

Fig. 11



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MACHINE FOR MAKING PRINTERS' LEADS, SLUGS, AND RULES

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Fig. 12

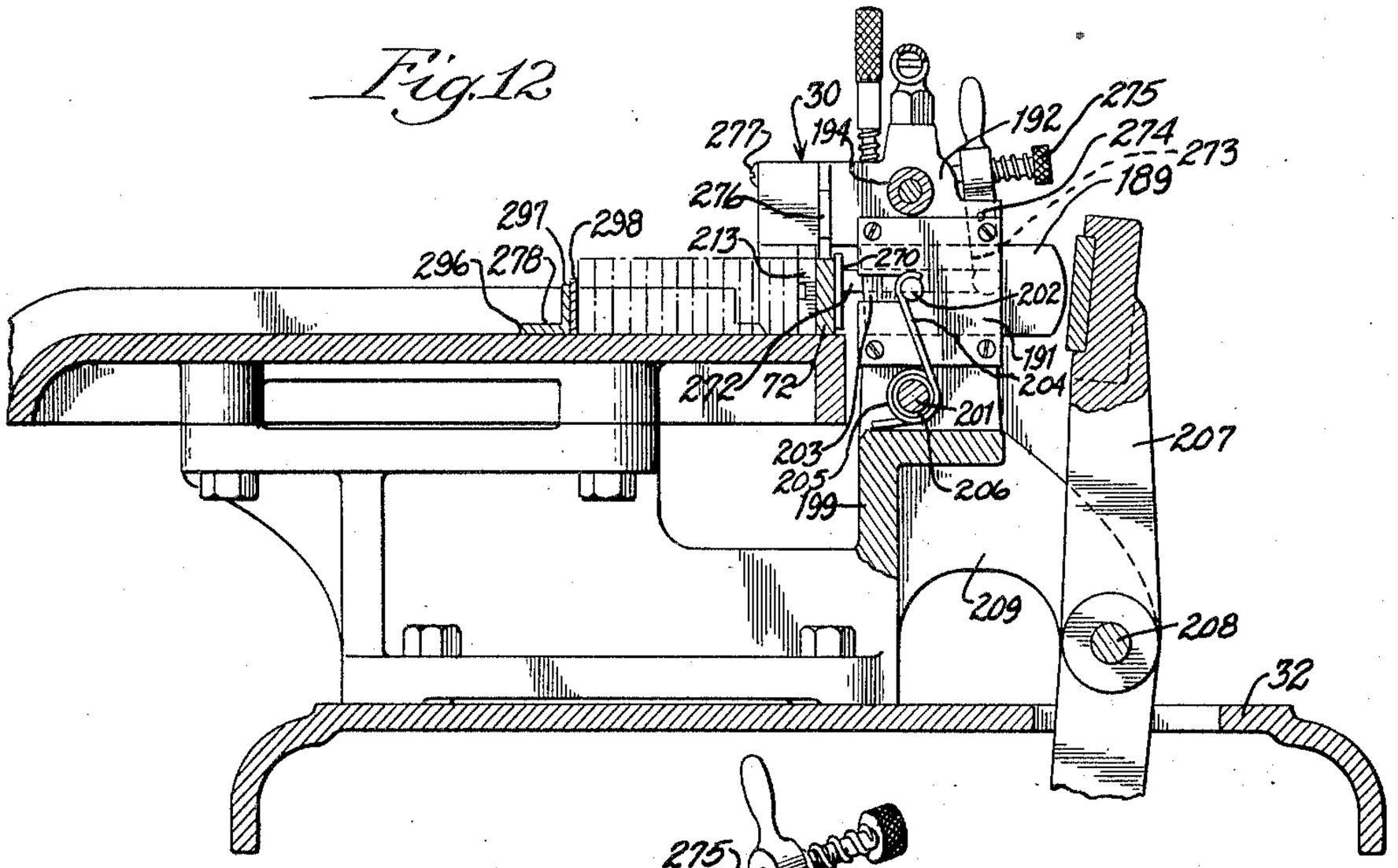


Fig. 13

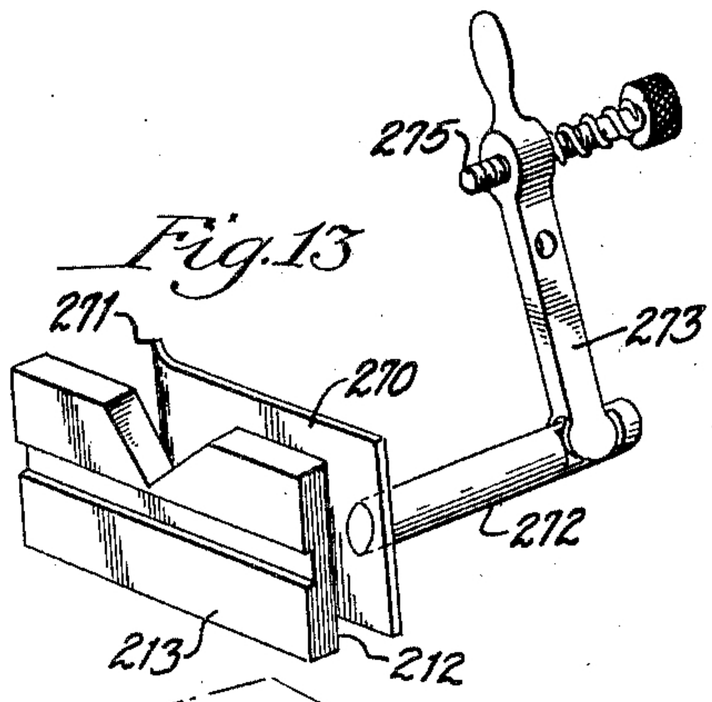
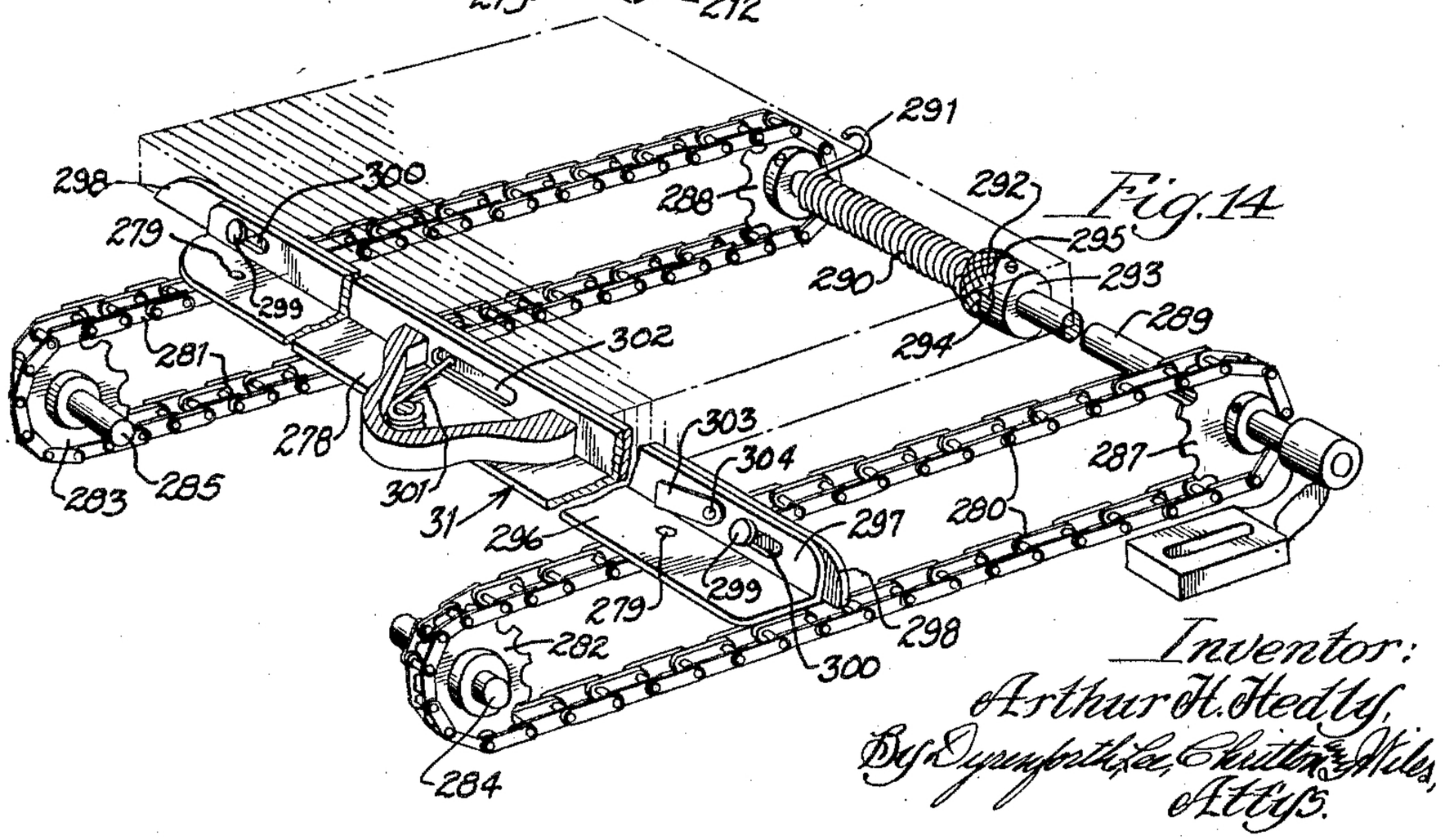


Fig. 14



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April 14, 1931. A. H. HEDLY 1,800,938

MACHINE FOR MAKING PRINTERS' LEADS, SLUGS, AND RULES

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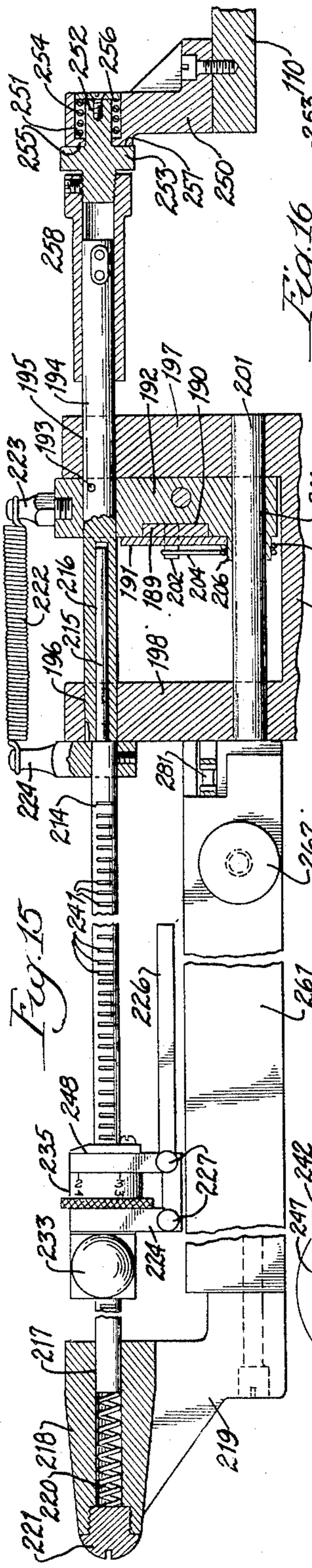

Fig. 15

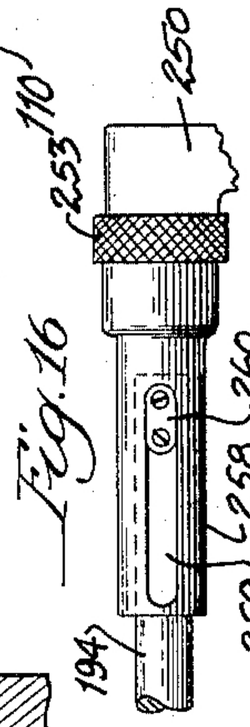

Fig. 16

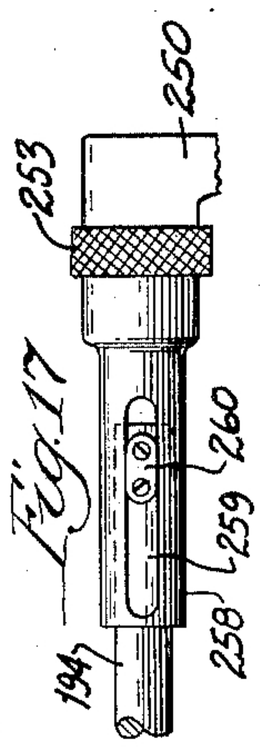

Fig. 17

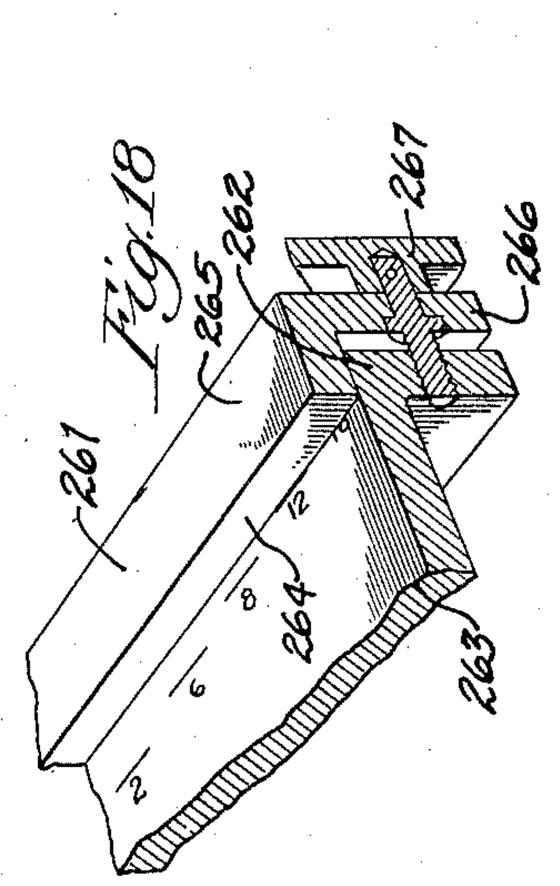

Fig. 18

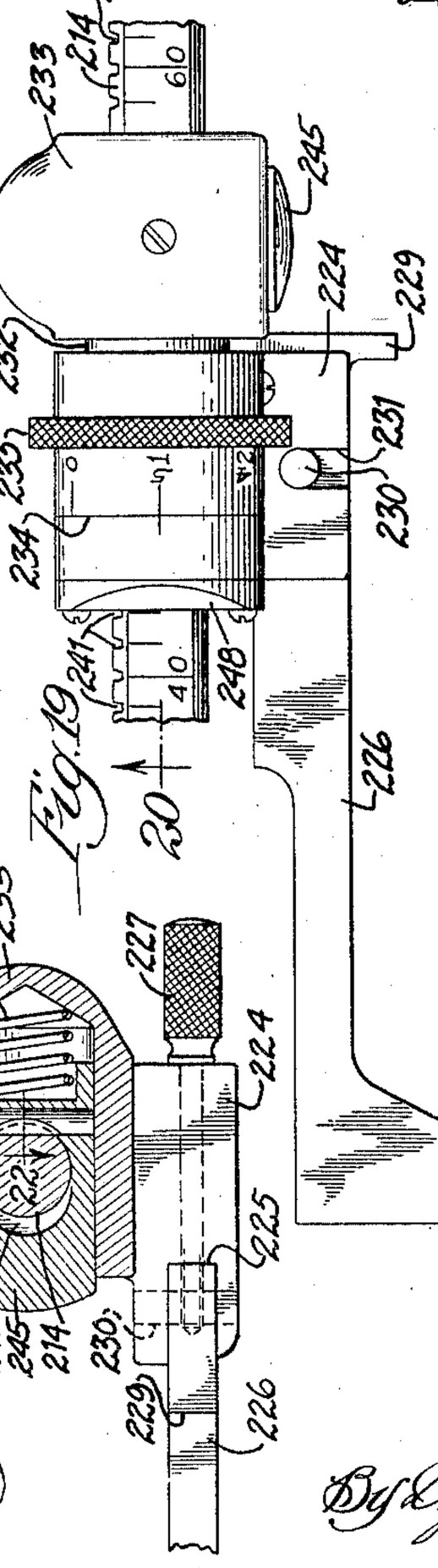

Fig. 19

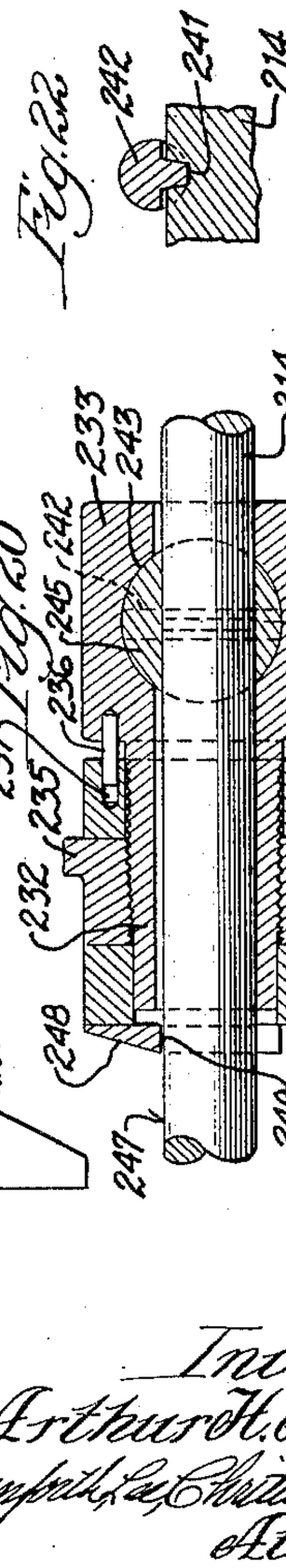

Fig. 22

Fig. 20

Fig. 21

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MACHINE FOR MAKING PRINTERS' LEADS, SLUGS, AND RULES

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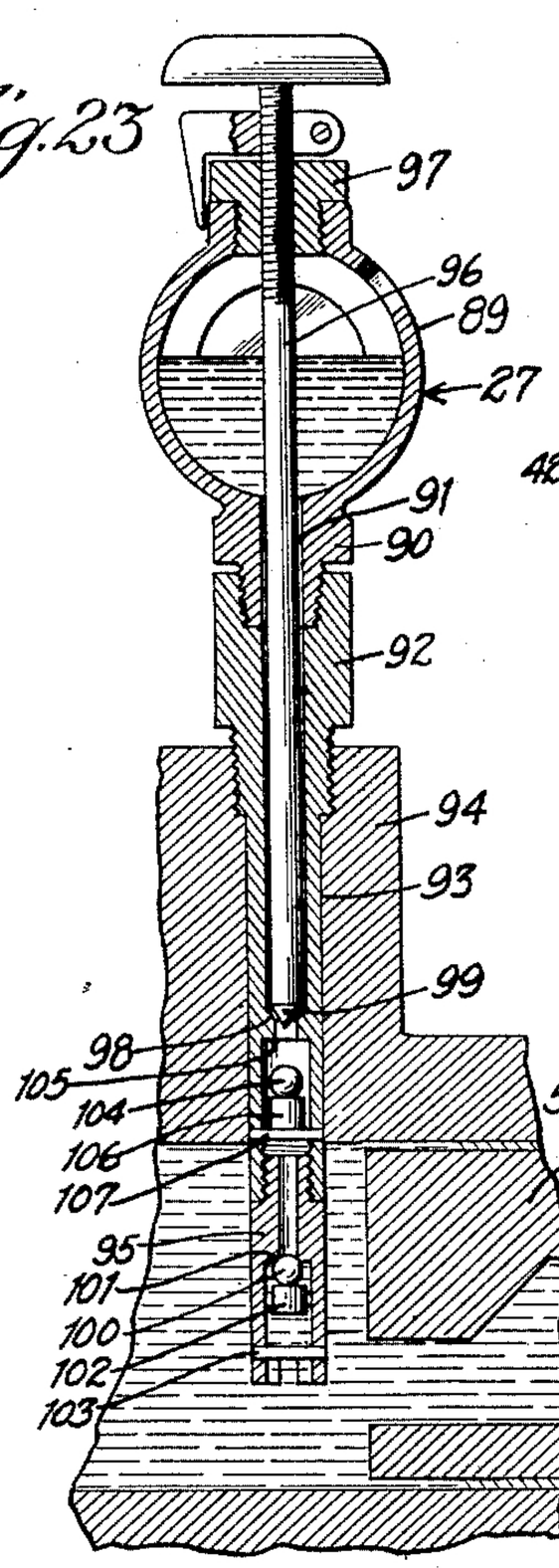
Fig. 23



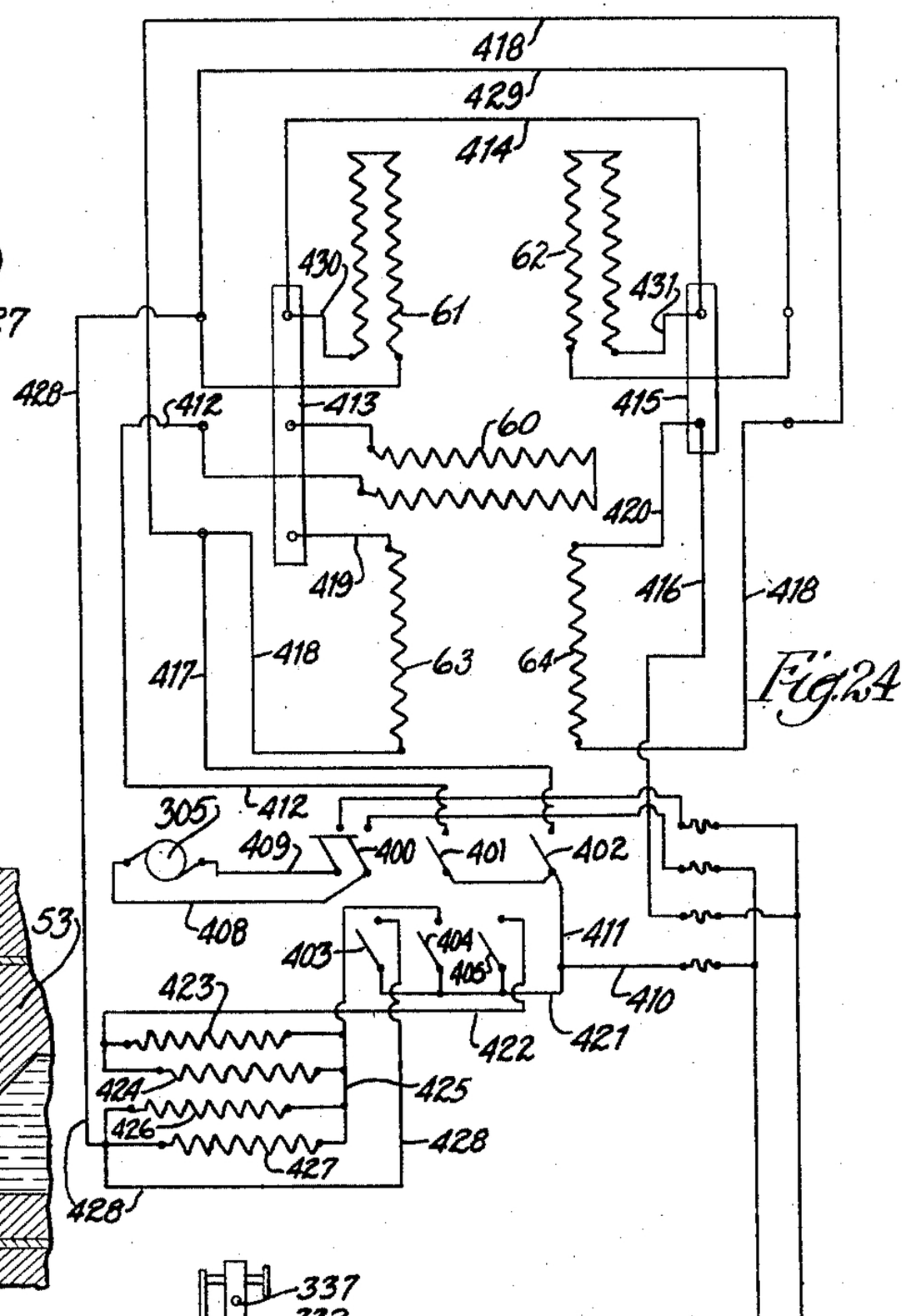
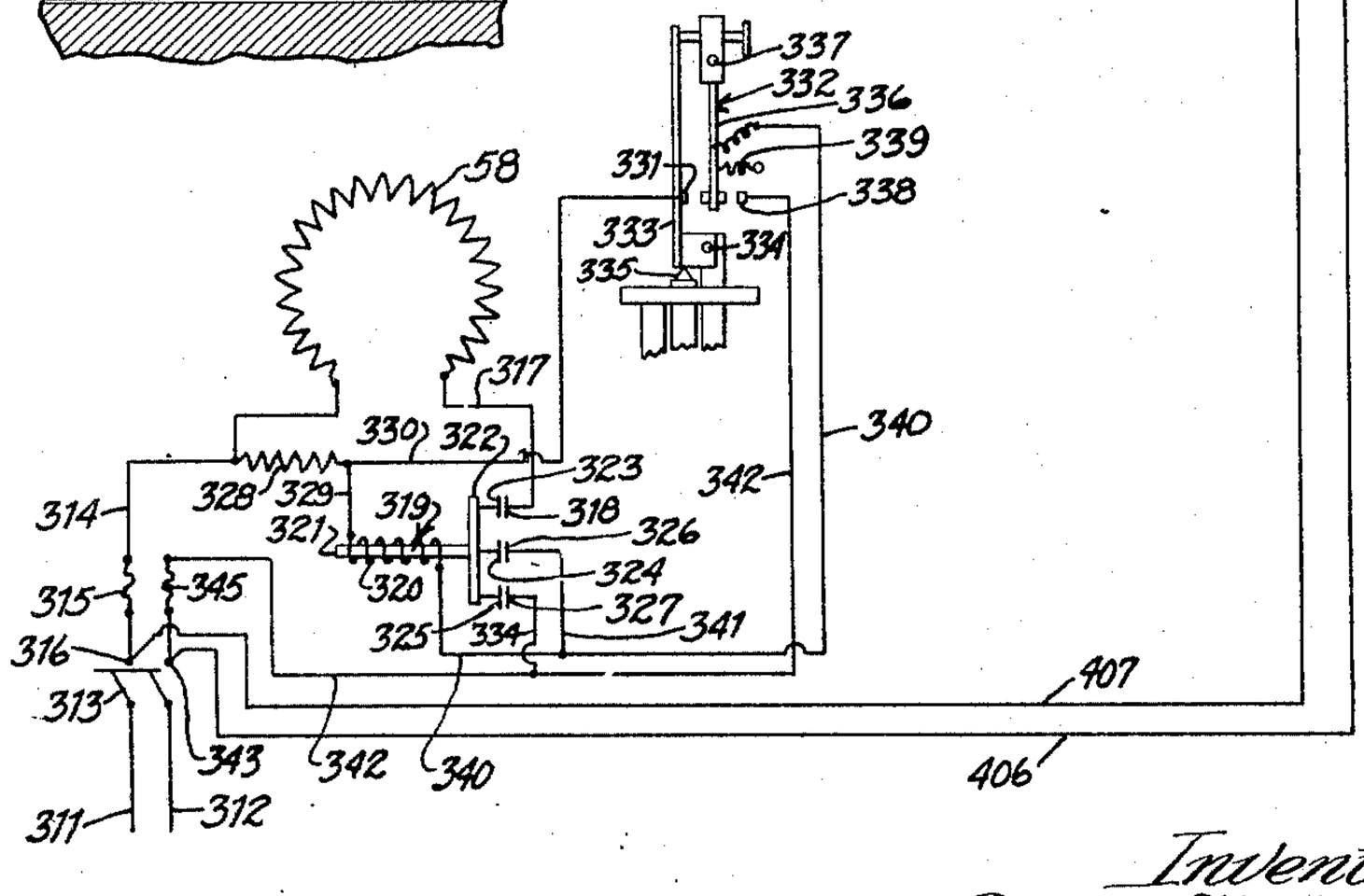


Fig. 24



Inventor:
Arthur H. Hedly,
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Attys.

Patented Apr. 14, 1931 1,800,938

UNITED STATES PATENT OFFICE

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MACHINE FOR MAKING PRINTERS' LEADS, SLUGS, AND RULES

Application filed March 30, 1929. Serial No. 351,369.

My invention relates more particularly to improvements in devices constituting elements of a machine for making, more especially, printers' leads, slugs and rules, particularly of the general type shown in United States Letters Patent, No. 1,438,951 granted to Benjamin S. Elrod on December 19, 1922, this type of machine comprising generally stated a die to which the molten metal for forming a continuous strip is fed and in which the metal becomes set in strip form; feeding means engaging the strip projecting beyond the die for advancing the strip, the molten metal being fed into the die as the strip advances; means severing the strip into sections of the desired length; and means for stacking the strip sections; the primary idea in providing such machines being to provide for such economical production of articles of this kind formed of the same, or similar, metal of which type is made, that the entire printing form comprising the type, leads, slugs, and rules may, without the requirement for separation of the leads, slugs, and rules from the type, be discarded, merely utilizing the metal of which the form elements are formed for new type, leads, slugs and rules.

My primary object is to provide improvements in such machines to the end that the machines will be better adapted for performing the work for which they are provided and be rendered more economical to maintain; to improve upon the various elements constituting the machine, and other objects as will be manifest from the following description.

Referring to the accompanying drawings:

Figure 1 is a view in side elevation of a machine embodying my improvements.

Figure 2 is a plan view of the crucible-equipped end of the machine of Fig. 1.

Figure 3 is an enlarged view in sectional elevation of the mechanism shown in Fig. 2, a portion of the means for operating the molten-metal pump being broken away.

Figure 3ª is a section taken at the line 3ª on Fig. 3 and viewed in the direction of the arrow.

Figure 4 is a view in elevation of a portion of the pump-operating means omitted in Fig. 3.

Figure 5 is a plan view of the mechanism which operates on the molded strip and comprising feeding means for the strip, clamping means for the strip, means for severing the strip into sections of the desired length, and means for stacking the strip-sections, the latter means being shown partly broken away.

Figure 6 is a section taken at the line 6—6 on Fig. 5 and viewed in the direction of the arrows, this section being taken at the strip-feeding mechanism.

Figure 6ª is a reduced view in plan section taken at the line 6ª on Fig. 6 and viewed in the direction of the arrow.

Figure 7 is a bottom plan section taken at the line 7 on Fig. 6 and viewed in the direction of the arrow.

Figure 8 is a section taken at the line 8 on Fig. 5 and viewed in the direction of the arrow.

Figure 9 is a section taken at the line 9 on Fig. 5 and viewed in the direction of the arrow.

Figure 10 is a broken perspective view of a detail of the mechanism for clamping the strip against retrograde movement in the operation of the strip-feeding mechanism.

Figure 11 is a view in end elevation of the main drive shaft of the machine and the mechanism by which it is driven.

Figure 12 is a section taken at the line 12 on Fig. 5 and viewed in the direction of the arrow, the section being taken at the strip-cutting mechanism.

Figure 13 is a persepective view of certain details of the mechanism for holding the strip against lateral displacement in the cutting operation.

Figure 14 is a perspective view, with certain parts broken away, of the strip-section stacking mechanism.

Figure 15 is a section taken at the line 15 on Fig. 5 and viewed in the direction of the arrow showing certain details of the mechanism for gaging the length of the strip-sections produced by the machine.

Figure 16 is a broken view in side elevation of a detail of the mechanism of Fig. 15 show-

ing the illustrated parts in one position they assume.

Figure 17 is a similar view showing the parts illustrated in Fig. 16 in a different position assumed thereby.

Figure 18 is a broken perspective view, showing the illustrated parts in section, of a detail of guide mechanism for the strip.

Figure 19 is a broken plan view of gaging mechanism forming a portion of the mechanism of Fig. 15.

Figure 20 is a broken sectional view in elevation taken at the line 20 on Fig. 19 and viewed in the direction of the arrow.

Figure 21 is a section taken at the line 21 on Fig. 20 and viewed in the direction of the arrow.

Figure 22 is a sectional view of a detail of certain of the mechanism shown in Fig. 21, the section being taken at the line 22 on Fig. 21 with certain parts omitted and one of the illustrated parts shown partly broken away.

Figure 23 is a vertical sectional view of the mechanism for supplying oil to the inner surfaces of the die; and

Figure 24, a view, in the nature of a diagram, of the various electrical circuits for the electrical devices forming elements of the machine.

The machine illustrated comprises, generally stated, means, represented generally at 25, for maintaining a body of molten metal from which the strips are to be formed, as for example and preferably type metal; die mechanism represented generally at 26 and to which the molten metal is supplied and in which the strip of the desired width and height, and either with or without a rule face, as desired, is formed; oil-feeding means, represented generally at 27, for feeding oil to the inner surfaces of the die to reduce the resistance to the drawing of the formed strip from the die; strip-feeding mechanism represented generally at 28 operating to intermittently engage the formed strip beyond the die and draw the strip through the latter; clamping means, represented generally at 29, for preventing retrograde movement of the strip in the idling movement of the feeding means to the point at which the strip-feeding operation begins; means, represented generally at 30, for severing the strip into sections of the desired length; and mechanism represented generally at 31 for automatically stacking the strip-sections.

The machine shown comprises a bed plate 32 supported on legs 33, and an end bracket-section 34, the various mechanisms above referred to being mounted upon this bed plate and bracket.

The mechanism 25 for maintaining a body of molten metal from which the strip is to be formed, comprises a crucible shown as formed of an outer casing-structure 35 mounted on the bed 32, open at its top, and having a bottom section 36; and a melting-pot proper 37, formed of refractory material located in the casing 35 and secured at its outwardly-extending surrounding flange portion 38 to the casing 35 in any desirable way, the side wall and bottom of the pot 37 being spaced from the casing as shown, in which space any suitable insulating material, as for example asbestos as represented at 39, is positioned.

The casing 35 contains an opening 40 into which a lateral extension 41 of the pot 37 extends, and forms a throat-portion, this throat-portion containing a channel 42 opening upwardly at a cylindrical portion 43 thereof through the bottom of the pot 37, substantially centrally thereof, the opposite end of this channel opening through the outer end of the throat-portion 41.

Superposed on the bottom of the pot 37 is a casting 44 of refractory material which presents an upwardly-extending cylindrical portion 45, the vertical opening in which is of the same size in cross section as the channel portion 43 and in direct vertical alinement therewith, the parts just referred to forming the cylinder portion of a pump hereinafter more fully described and which operates to force molten metal out of the crucible to the die in which the strip is to be formed, the cylinder 45 containing passages 46 in its side wall through which the molten metal in the crucible enters this pump cylinder.

The member 44 is provided with a lateral extension 47 having at its outer end an upright cylinder portion 48, there being a passage 49 communicating at one end with the portion 43 of the channel 42 and opening through the side wall of the cylinder 48, this passage being controlled by valve mechanism hereinafter described.

The mechanism 25 also comprises a cover portion 50 for the crucible, preferably formed with a heat-insulating section, as represented at 51, this cover containing an opening controlled by a hinged closure 52 and through which opening the condition of the metal within the crucible may be observed and through which opening the metal may be charged into the crucible.

The die to which the molten metal passes from the crucible and which forms a portion of the mechanism 26 is represented at 53, this die being of substantially rectangular shape in cross-section and containing a die-opening 54 therethrough which at its outlet portion is of the same width and height as the strips to be formed therein, the bottom wall of this opening being so shaped as to cause the upper edge of the strip formed therein to be of the desired shape, namely, either flat, as for example where the strip is to be used in the making of leads and slugs, or of a shape to produce a rule printing surface, as in the case of rules.

The die 53 is located in, and extends lengthwise of, an opening 55 extending through a housing 56 secured in the position shown (Fig. 3) to register at the inner end of the opening therethrough with the outer end of the channel 42, the die 53, the cross-sectional dimensions of which are less than those of the opening 55, reaching short of the crucible extension 41, whereby a chamber 57 is provided in the member 56 between the die 53 and the crucible-extension 41.

The outer face of the crucible-extension 41 contains an outwardly-flaring recess 41ª into which the channel 42 opens, and into which a circular tapered boss 56ª on the housing extends, to make a tight joint, the housing being secured in place by screws 56ᵇ extending therethrough and screwing into the extension 41.

The mechanism 25 also comprises heating means for maintaining the metal in the crucible 37 and in the throat-portion thereof and in the inlet portion of the die 53, in molten condition, the means for this purpose comprising an electrical heating unit 58, in the form of an annulus, immersed in the body 59 of the metal in the crucible and surrounding the cylinder 45; an electrical heating unit 60 located at the bottom of the crucible and extending lengthwise along the channel 42; a pair of electrical heating units 61 and 62 positioned at the throat-portion of the crucible at opposite sides of the outlet end of the channel 42; a pair of electrical heating units 63 and 64 located in the housing 56 at opposite sides of the opening 54 and between the forward extremity of the crucible extension 41 and the forward, or outlet, end of the die 53, the means for controlling the supplying of current to these several heating elements being hereinafter described.

As will be understood, the provision of the heating elements 58, 60, 61, and 62, is to ensure the maintenance of the metal in fluid condition up to a point where it is caused to become set in the die 53 by the subjection of the metal to cooling means, as hereinafter described.

The bottom heating unit 60 of rectangular plate-like form is secured, in any suitable way, flatwise against the underside of the throat-portion of the crucible and the flat underside of the housing 56; and the heating units 61 and 62 of the same form as the unit 60 fit flatwise against opposite sides of the throat-portion of the crucible and the adjacent sides of the housing 56, the units 61 and 62 being held in place by clamp-screws 61ª threaded in the casing 35 and bearing against plates 61ᵇ between which and the units 61 and 62 insulating material 61ᶜ, such as asbestos, is interposed.

It may be here stated that the die 53 is sealed in the housing 56 by metal supplied from the crucible 37 and to this end the passage 49 is provided whereby molten metal from the crucible flows through this passage and thence through the channel 42 into the space around the die 53, the heating elements 63 and 64 in this operation being energized to heat the housing 56 to such a temperature that the metal supplied thereto is maintained in molten condition and completely fills the space around the die 53, whereupon the elements 63 and 64 are deenergized and the metal around the die 53 solidifies, sealing the latter in place.

The passage 49 contains a rotary valve 65 of cylindrical form located, and rotatable, in the cylinder 48 and having a cross port 66 which, when the valve is in one position, forms a part of the passage 49 but when rotated to a different position, closes this passage, the valve 65 having an upwardly extending stem 67 by which it may be rotated.

It will be understood that the heating elements 63 and 64 also serve as means, when energized, to melt the sealing metal around the die 53 to permit of the removal of the latter when desired.

In the forming of the strip, the metal supplied to the die 53 is caused to solidify adjacent the outlet end of the die passage 54, and as a means for effecting this result, the housing 56 is provided with a channel 68 which surrounds the die 53 and through which cooling water is circulated, the arrangement shown for thus circulating water comprising a pipe 69 which leads from any suitable source of supply of cooling water and opens into the bottom of the channel 68, this channel communicating at its upper end with an outlet pipe 70 discharging into a drain 71. The cooling water entering the bottom of the channel 68 divides and flows upwardly through opposite sides of the channel 68 and discharges through the outlet 70.

It is desired that during the energizing of the heating units 63 and 64, flow of cooling water to channel 68 be discontinued and this channel drained, the latter being effected through a pipe 70ª valved at 70ᵇ and leading from the bottom of channel 68 into the drain 71.

As hereinbefore stated, the feeding of the molded strip, represented at 72, out of the die 53 is effected by pulling force applied thereto beyond the die 53, this feed being intermittent. In order that the strip be formed of a continuous length, the molten metal must be caused to flow into the die-channel in the die 53 in sufficient volume to maintain the same completely filled at all times. This is provided for in the machine shown by the pump hereinbefore referred to and provided in the crucible 37, this pump comprising the cylinder 45 and a piston 73 reciprocable therein and pivotally connected at 74 with the lower end of a link, the upper end of which is pivotally connected at 75 with one

end of a rock arm 76 journalled at 77 on a bracket arm 78 on the cover 50, the other end of the arm 76 being pivotally connected at 79 with the upper end of a rod 80, the lower end of which is connected with a head 81 slotted at 82 and carrying a roller 83 at its lower end, this roller cooperating with a cam 84 rigidly connected with a shaft 85 and constituting the main shaft of the machine, this shaft extending longitudinally of the machine below the bed 32 and being journaled in suitable bearings on the machine frame. The roller 83 is normally held at all times against the periphery of the cam 84 by a coil spring 86 surrounding the rod 80 and confined between a stationary member 87 on the frame of the machine and through an opening in which the rod 86 is reciprocable, and stop means 88 carried on the upper end of the rod 80, the piston 73 thus being operated on its power stroke by the spring 86.

The parts of the machine are so proportioned and arranged, as hereinafter described, that during the movement of the strip-feeding mechanism toward the die 53 for positioning this mechanism preliminary to the feeding of the strip from the die, the piston 73 rises uncovering the openings 46 and permitting molten metal to flow into the cylinder 45 and during the feeding of the strip by the strip-feeding mechanism the piston 73 is forced downwardly to force the molten metal through the channel 42 and into the die-channel 54.

Referring now to the means 27 for feeding oil into the die channel 54, these means comprise (Figs. 3 and 23) an oil reservoir 89 having a hollow boss 90 at its lower end containing an outlet 91 for the reservoir, this boss screwing, and opening, into the upper end of a tubular member 92 mounted in an opening 93 in a boss 94 extending upwardly from the member 56, the lower end of the tubular member 92 being connected with, and opening into, the upper end of a tubular member 95 which depends into the chamber 57. The structure just described also comprises a needle-valve 96 having screw-threaded engagement with a closure-cap 97 of the reservoir 89, this needle-valve extending downwardly through the opening 91 in the boss 90 and part way into the opening through the tubular member 92 with only a slight clearance between the needle-valve 96 and the walls of the opening in which it is located. Toward the lower end of the tubular member 92 a valve seat 98 is provided with which the valve portion 99 of the needle-valve 96 cooperates, the flow of the oil from the reservoir 89 being regulated by adjustment of this needle-valve.

As the lower end of the oil-feeding means now being described extends into the molten metal in the chamber 57, means are provided for preventing the flow of the molten metal into the oil-feeding means, beyond a certain point, on the power stroke of the piston 73, these means comprising a main check-valve 100 shown as in the form of a ball located in the enlarged portion of the passage in the tube 95 and adapted to seat upwardly against a seat 101, this ball being shown as resting on a block 102 presenting a flat bottom and adapted to float on the molten metal within the tube 95 and restrained against dropping out of the tube by a cross pin 103. As a safety means, a second check-valve in the form of a ball 104 is provided in the passage within the tubular member 92 for cooperation with a seat 105, this ball being supported on a similar block 106 which floats in the molten metal should the latter rise to this height in the oil-feeding passage, a stop pin 107 limiting the descent of the block 106 and valve 104.

The purpose of the block-floats is to maintain the balls out of contact with the molten metal and thereby avoid the possibility of failure of the balls to properly seat against the seats with which they cooperate.

The oil is supplied from the oil-feeding means to the chamber 57 upon the suction stroke of the piston 73, the oil, upon the pressure stroke of the piston, passing, with the metal, into the die-channel 54 and forming a film upon the walls of the latter which permits the metal to more freely flow into the die and avoids undue resistance to the movement of the formed strip 72 in the die.

By forming the oil-feeding means as described, uniform, closely regulated, flow of the oil to the die channel is provided for, this being desirable as the supplying of the die channel 54 with either an excess or a deficiency of oil is objectionable. If desired, the suction exerted on the oil-supplying means may be regulated to some degree by manipulating the valve 65 which affects the oil feed and thus may serve as a factor in regulating the oil-feed.

Referring now to the details of the illustrated strip-feeding mechanism 28, this mechanism comprises a base 108, in the form of a housing stationarily mounted on the bed 32 and containing in its upper portion a dovetail slot 109 extending longitudinally thereof. Mounted on the top of the member 108 is a slide 110 having a depending dovetail portion 111 interfitting with the walls of the dovetail slot 109, this slide being reciprocable on the member 108 lengthwise of the machine and parallel with the longitudinal axis of the latter. The upper surface of the slide 110 contains a recess 112, the form of this recess being such, as shown, that one of its side walls, represented at 113, extends parallel with the longitudinal axis of the machine and its opposite side wall, represented at 114, inclines toward the right-hand end of the machine in Fig. 5 away from this

axis. The wall 113 is lined with a bar 115 of uniform width faced by a filler bar 116 likewise of uniform width, and the wall 114 is faced by a bar 117 of uniform width with its inner upper edge portion beveled as represented at 118. The slide 110 is thus formed in its upper surface with an effective recess defined by the opposing surfaces of the members 117 and 116, one side of which is parallel with the longitudinal axis of the machine and substantially coincident with the adjacent face of the formed strip 72, as shown in Figs. 5 and 6, and the other side of which is spaced from the strip 72 and inclines toward the right-hand end of the machine in Fig. 5 in a direction away from this strip.

The mechanism now being described also comprises a plate member 119 having a lateral extension 120 at which the plate 119 is hingedly connected with a shaft 121 supported at its ends in spaced-apart blocks 122 rising from, and secured to, the slide 110, the shaft 121 extending parallel with the inclined inner face of the member 117. The plate member 119 is thus adapted to be swung at its hinge connection with the slide 110 into and out of the position shown in Figs. 5 and 6.

In order that the strip-feeding mechanism, the further details of which are hereinafter described, may be adapted for the feeding of formed strips of different widths, the plate member 119 is slidable at its extension 120 along the angularly disposed shaft 121, the plate 119 being held in any desired position of adjustment along this shaft by gage-blocks 123 pivotally mounted on a rod 124 secured at its ends in the supporting blocks 122 and extending parallel with the shaft 121, these blocks being provided with finger portions 123[a] at which they are adapted to extend between the extension 120 of the plate 119 and the adjacent supporting blocks 122. The gage-blocks are independently rotatable into and out of the position just stated, the dotted lines shown in Fig. 8 representing the position to which the blocks may be turned and thus the plate 119 may be adjusted to any desired position along the shaft 121 and the gage-blocks then turned back to a position for holding the plate 119 in the adjusted position. The gage blocks 123 are of graduated widths as shown and bear legends indicating the positions to which the plate 119 should be adjusted along the shaft 121 to correspond with different widths of strip 72 to be operated on. Thus, in the drawings, the plate 119 is adjusted to a position for feeding twelve pica strips. If, by way of example, eighteen pica strips are to be fed, the gage block 123 with the indication "18" thereon should be turned back, the plate 119 adjusted to the right in Fig. 5 and this particular gage block positioned between the extension 120 and the one of the gage blocks 123 designated "12", it being noted that by adjusting the plate member 119 to the right in Fig. 5, it is bodily shifted in a direction away from the strip 72 and when adjusted to the left in this figure, is bodily moved in a direction toward this strip.

The plate 119 is held against upward displacement from the position shown in Figs. 5 and 6, by a lock-bolt 126 vertically movable in an opening 126[a] in the plate 119, its upper threaded end being engaged by a nut 126[b]. The lower headed end 127 of the lock-bolt extends into a slot 128 in the slide 110 of T-shape in cross section (Fig. 6), this slot being enlarged at one end, as indicated at 129, which permits the plate 119 to be swung on its hinge when this plate is moved along the shaft 121 to a position in which the head 127 of the bolt 126 registers with the enlargement 129.

The slide 110, together with the parts carried thereby, is reciprocated by means of a pin 130 depending from the slide and provided with a roller 131 which extends into the continuous cam groove 132 of a cam 133 mounted on the upper end of a shaft 134 journaled in a bearing 135 on the base plate 32, this shaft being driven by a bevel pinion 136 meshing with a bevel pinion 137 on the shaft 85.

Located in a recess 138 in the member 119 and extending into the recess 112 in the body portion of the slide 110 is a wedge block 139 between the side 140 of which and the liner strip 116, the strip 72 extends (Figs. 6 and 7), the opposite side of the block 139 being inclined, as represented at 140[a], at which portion it is provided with a series of ball-bearings 141 held in spaced relation to each other by a cage 142, these balls opposing the inclined inner face of the liner strip 117 as shown in Fig. 6.

The wedge block 139 is loosely engaged by a crank pin 143 on a shaft 144 extending crosswise of, and journaled in, the member 119, the shaft 144 having a radially-extending pin 145 connected with one end of a coil spring 146, the opposite end of which is connected with a pin 147 stationary on the member 119, the arrangement of these parts being such that the spring tends to rotate the shaft 144 in a direction to force the wedge-block 139 to the left in Fig. 5, namely, into wedging position against the strip 72. The outer end of the shaft 144 has rigid thereon a cylindrical head 148 containing a recess 149 in the lower portion of its periphery in which a roller 150 is journaled to partly project beyond the periphery of the head 148, this roller, in the position of the parts shown in Fig. 5 being shown as substantially vertically alined with the axis of the shaft 144.

On the stationary member 108, directly below the path of movement of the head 148, is

a bar 151 adjustable longitudinally of the machine in a groove 152 in the upper side of the member 108, this bar being adjusted by means comprising a shaft 153 journaled at 154 on the member 108 and held against lengthwise movement and having threaded engagement at its inner end with the adjacent end of the bar 151. A clamp screw 151[a] screwing at its end into the bar 151 and extending into a slot 151[b] in the member 108 affords means for maintaining the bar 151 against accidental displacement.

The bar 151 is provided on its upper surface, at one end, with a raised portion 155 having an incline 156, the portion 155 being at such an elevation that in the movement of the slide 110 to the left in Fig. 5, the roller 150 engages the incline 156 and rides upon the portion 155 with the result of rotating the shaft 144 in a direction to shift the wedge-block 140 toward the right in Fig. 5, thereby overcoming the tendency of the spring to force the wedge-block into wedging engagement with the strip 72. The parts just described remain in the relative positions stated until the roller 150, in the movement of the slide 119 to the right in Fig. 5, moves beyond the raised portion 155, whereupon the spring 146 becomes effective to exert yielding pressure on the wedge block 140 tending to shift it to the left in Fig. 5 which results in the firm gripping of the strip 72 between the wedge-block and the liner strip 116 for effecting the feeding of the strip 72.

It will be understood by adjusting the bar 151 lengthwise of the machine, the length of the feed stroke may be increased or diminished as desired, this being of advantage in that, in general, the thicker the molded strip to be formed, the shorter the feed stroke should be.

Located to the right in Fig. 5 of the feed mechanism 28 is a presser-device 157 in the form of a lever 157[a] fulcrumed at one end, as represented at 158, to a stationary part of the machine and equipped at its other end with a roller 159 held down against the upper edge of the strip 72 by a screw 160 freely rotatable in the lever 157[a] and screwing at its lower end into the stationary part to which the lever 157[a] is pivoted, a tension spring 160[a] holding the lever 160 against the underside of the head of the screw.

The mechanism 29 for clamping the molded strip 72 against retrograde movement in the movement of the slide 110 to the left in Fig. 5 comprises a cylinder 161 mounted on, and rigidly secured to, a bracket 162 secured to the bed plate 32, this cylinder containing a piston 163 slotted between its ends at 164 and containing a cross pin 165 which is straddled by the upper forked end 166 of a lever 167 which extends upwardly into the slot 164 and is fulcrumed at 168 on a stationary part of the machine. The piston 163 is backed by a coil spring 169 located in the end of the cylinder 161 and interposed between the piston 163 and an adjustable stop-plug 170 screwed into this end of the cylinder. The opposite end of the piston 163 contains a horizontally extending slot 171 into which a horizontally extending clamp bar 172 extends freely, this bar being located alongside of the molded strip 72 and operating when the piston 163 is moved to the right in Fig. 9 to clamp the strip 72 against a stationary bar 173 secured to an upstanding flange 174 on an extension 175 of the cylinder 161.

The clamp bar 172 at the portion thereof to the left in Fig. 5 of the cylinder 161, is connected with a spring-pressed plunger 176 mounted in a socket 177 in an extension 178 of the cylinder 161 which operates not only to prevent lengthwise shifting of the bar 172, but also causes the left-hand end of this bar in Fig. 5 to press relatively lightly against a side of the molded strip 72. The connection between the plunger 176 and the bar 172 comprises a pin 179 passing through the bar 172 and through the outer end 180 of the plunger 176 which is set into a recess 181 in the side of the bar 172. The spring for pressing the plunger toward the bar is represented at 182. It surrounds a stem 183 of the plunger and is confined between the plunger and the end wall of the recess 177. The stem 183 projects outwardly beyond the cylinder extension 178 where it is pivotally connected at 184 to a manually operated lever 185 fulcrumed at its lower end, as indicated at 186, to the extension 178.

The mechanism for operating the piston 163 to clamp the formed strip 72 during the movement of the slide 110 to the left in Fig. 5 comprises the lever 167 above referred to, the lower end of which is provided with a roller 187 and a cam 188 rigidly secured to the main shaft 85 and against which the roller 187 bears continuously.

Referring now to the mechanism 30 for severing the formed strip 72 into strip-sections of the desired length, this mechanism comprises a knife 189 reciprocably mounted in a recess 190 having a cover-plate 191, in a block 192 rigidly connected by a pin 193 with a rod 194 between the ends of the latter. The rod 194 is reciprocable in alined openings 195 and 196 in spaced-apart uprights 197 and 198 on a stationary bracket member 199 secured to the bed 32 of the machine. The block 192 contains an opening 200 therethrough at which it is slidable on a stationary guide rod 201 secured at its opposite ends in the uprights 197 and 198 and parallel with the reciprocable rod 194.

The knife 189 is provided with a laterally extending pin 202 projecting through a slot 203 in the cover plate 191 and engaged by one end 204 of a tension spring 205 encircling, at its coil portion, a hub 206 on the

block 192 and surrounding the rod 201, this spring yieldingly holding the knife 189 in the retracted position shown in Fig. 12.

The knife 198 is actuated by a lever 207 fulcrumed at 208 on an extension 209 of the stationary member 199, the lower end of this arm carrying a roller 210 engaging at its periphery with a cam 211 rigidly secured to the drive shaft 85.

The block 192 is normally in a position, as shown in Fig. 5, in which the knife 189 carried thereby extends to the left in this figure out of the path of movement of the upper end of the lever 207, the knife being positioned for operation by the lever 207, only when the formed strip 72 projects to the right in Fig. 5 beyond the knife edge 212 of a stationary plate 213, a distance equal to the length of the strip-section to be produced, at which time the formed strip 72 is at rest.

The mechanism for thus shifting the cutter-equipped block 192 and which is actuated by the formed strip 72 comprises a rod 214 having at one end a portion of reduced diameter, as represented at 215, at which it slidingly extends into a socket 216 in one end of the rod 194, the other end of the rod 214 being slidably mounted in a socket 217 in a lug 218 on a plate member 219 connected at one end with the bracket member 199 and at its other end with the frame bracket 34, the rod 214 being backed by a coil spring 220 located in the socket 217 and interposed between this rod and a plug 221 at the end of the socket 217.

The rods 194 and 214 are connected together by a coil spring 222, the opposite ends of which are attached, respectively, to a post 223 on the block 192 and a collar 224 rigid on the rod 214, the block 192 being shifted into a position for actuation of its cutter 189 by the lever 207, by the pull exerted thereon through the spring 222 when the rod 214 is moved to the left in Fig. 15.

The rod 214 is equipped with a device which extends into the path of movement of the terminal end of the formed strip 72 and which is moved to the left in Fig. 15, together with the rod 214, in the continuing movement of the formed strip 72, the device referred to being adjustable into different positions lengthwise of the rod 214 to provide for the cutting of the formed strip into strip-sections of any desired length.

The device just referred to comprises a block 224 loosely surrounding, and movable along, the rod 214 and containing a recess 225 into which a tappet-bar 226 extends between its ends, this bar being secured to the block 224 by screws 227, the bar 226 extending lengthwise of, and parallel with, the rod 214. The bar 226 is provided at opposite ends with lugs 228 and 229 and adjacent the lug 229 with a cross pin 230 which extends into vertically alined recesses 231 in the upper and lower walls of the recess 225, this pin serving to properly position the bar 226 in the block 224.

The bar 226 is provided for engagement by the terminal end of the formed strip 72 and is reversible end for end in the block 224 to present either lug 228 or 229 to the strip 72, depending on the length of the strip sections to be provided, the bar 226 being positioned reversely to the position shown in the drawings when it is desired to produce very short strip sections.

The block 224 is associated with a sleeve member 232 surrounding, and slidable along, the rod 214 and extending at one end into the space between the block 224 and the rod 214 and having a head 233 at its opposite end beyond the block 224, the block 224 and sleeve member 232 being relatively movable in a direction lengthwise of the rod 214.

The block 224 contains a recess 234 into which a nut 235, threaded on the sleeve member 232, is located and by the rotation of which the block 224 may be moved lengthwise relative to the sleeve member 232, this block and sleeve being held against relative rotary movement by a pin 236 on the head 233 which slidingly extends into a recess 237 in the block 224. To prevent accidental rotation of the nut 235, a shoe 238 slidable in a recess 239 in the block 224 and pressed against a face of the nut 235, by a spring 240, is provided.

The rod 214 is provided along a side thereof with a series of notches 241 with which a pawl 242 on the head 233 of sleeve member 232 engages for locking this sleeve member in adjusted position along the rod 214. The pawl 242 is slidably mounted in a socket 243 in the head 233 and is backed by a spring 244 which urges the pawl toward the notched side of the rod 214. Slidable in the outer end of the socket 243 is a plunger 245 which, at an opening 246 therein, freely surrounds the rod 214 and opposes the pawl 242 and by which the latter may be pressed, against the action of the spring 244, out of engagement with the notched portion of the rod 214 to permit the sleeve member 232, together with the block 224 and the tappet-bar 226, to be freely slid together along the rod 214, the nut 235 threaded upon the sleeve 232 as stated, and engaging the block 224, furnishing a means by which a very accurate, or fine, adjustment of the bar 226 along the rod 214 may be effected.

To prevent rotation of the block 224 and the parts carried thereby, the upper surface of the rod 214 is made flat, as represented at 247, and the block 224 is provided with a plate 248 which straddles the rod 214 and has a flat surface 249 extending closely adjacent the flat surface 247 of the rod 214.

It will be understood from the foregoing that in the feeding of the formed strip 72 to the right in Fig. 5 and to the left in Fig. 15,

the terminal end thereof engages the end of the tappet-bar 226 opposing it, thereby shifting this bar and with it the rod 214 and, through the spring connection 222, the block 192 and rod 194, which causes the knife 189 to extend into the path of movement of the lever 207 in the rocking of the latter which occurs only when the strip 72 is at rest, the strip thus being severed into a strip section of a length gaged by the setting of the tappet-bar 226 along the rod 214 by the mechanism above described.

The return of the cutter-equipped block 192 to the normal position shown in Fig. 15 is provided for primarily by a direct mechanical connection with a positively driven part of the machine, as for example and preferably the slide 110, through the spring 220, through the abutment of the rod 214 with the rod 194 exerts force, urging the block 192 to the normal position stated.

The mechanical connection shown comprises a bracket 250 connected with, and rising from, the slide 110 and containing an opening 251 in which the shank 252 of a screw-device 253 is slidably movable, a coil spring 254, surrounding the shank 252 and confined between a flange 255 on the upright and a disk 256 on the shank, yieldingly holding the device 253 at a shoulder 257 thereon against the upright 250. The other end of the screw-device 253 is screwed into a tube 258, containing a slot 259 extending longitudinally thereof, and telescoping with the adjacent end of the rod 194, the latter having a projection 260 at its side which slidingly extends into the slot 259.

In the normal position of the mechanism shown in Fig. 15, namely, the position in which the cutter device 189 extends out of the path of movement of the lever 207, the slide 110 may reciprocate without affecting the position of the cutter-equipped block 192, but the arrangement of the various parts described is such that the movement of the slide 110 to the left in Fig. 5 following the shifting of the block 192 and the rod 194 to the left in Fig. 15 and the concluding of the strip cutting operation, causes the left-hand end wall of the slot 259 (viewing the slot in Figs. 15, 16 and 17) to engage the projection 260 on the rod 194, in the final movement of the slide 110 to the left in Fig. 5, thereby positively ensuring the returning of the block 192 to normal position (Fig. 15) in which the cutter 189 is out of the path of movement of the actuating lever 207. The spring connection between the screw-device 253 and the upright 250 is provided primarily as shock-absorbing, or cushioning, means, the spring connection 222 operating to prevent damage to the operating mechanism in case any obstruction to the movement of the block 192 to normal position is presented.

To the right in Fig. 5 beyond the cutter 189 is a guide bar 261 for the mold strip 72, this bar being of angle shape in cross section and fitting over the upper corner edge 262 of a table portion 263 secured to the brackets 199 and 34. The inner edge 264 of the upper flange 265 of the bar 261 flatwise opposes the molded strip 72 and its depending flange 266 carries spaced-apart adjusting screws 267 (one only of which is shown) which are rotatable in the flange 266 and are held against lengthwise movement therein, these screws bearing at their inner ends against the adjacent edge of the table top 262. By adjusting these screws the bar 261 may be adjusted for formed strips of different widths, the table top being shown as provided with markings to guide the operator in adjusting this bar. The left-hand end, in Fig. 5, of the bar 261, is preferably provided with a finger 268 having a receding surface 269 which ensures the proper guiding of the end of the formed strip 72 into a position in which it moves along the side 264 of this bar.

In order that the cutter 189 effect clean severance of the strip 72, the block 192 is provided with the plate 213 presenting a knife edge 212 which backs the formed strip at the line of severance.

The molded strip 72 should press firmly against the stationary cutter plate 213 at the beginning of the cutting operation and to ensure this condition a presser-plate 270 is provided opposite the stationary cutter plate 213, the plate 270, which has an outwardly deflected strip-guiding end-portion 271, being connected with one end of a pin 272 slidable in the block 192, this pin being pivotally connected at its outer end with the lower end of a lever 273 fulcrumed at 274 on the block 192 and having a screw-pin 275 threaded at its upper end, the screw 275 bearing against a part of the block and holding the plate 270 against the side of the formed strip 72 with the desired pressure.

As will be understood, the cutter 189, in performing the cutting operation, shifts the severed end of the strip-section to the left in Fig. 13 beyond the path of movement of the strip 72, from which the strip-section was cut, and as a means for holding the strip-section in the displaced position referred to and thus out of the path of movement of the terminal end of the continuous strip 72 as it is fed through the machine, a dog 276 which locks the strip out of such path, is provided. This dog is in the form of a lever pivoted at 277 to the block 192 and bearing by gravity upon the top of the strip 72 as the latter is advanced beneath it by the operation of the machine. When the cutter shifts the strip section, as stated, this dog drops down in front of the severed strip-section and holds it out of the path of movement of the advancing strip which latter,

at its upper surface, engages the dog and lifts it so that when the next strip section is cut, this dog drops in front of this section, the movements just described continuing throughout the continued operation of the machine.

The strip-section-stacking mechanism 31 comprises the table top 263 upon the top of which a follower device 278 is mounted to extend parallel with the path of movement of the continuous formed strip 72 through the machine. The follower 278 is connected at 279 with the upper reaches of sprocket chains 280 and 281 which engage sprockets 282 and 283 carried by stub shafts 284 and 285 journaled on the table top, which latter is slotted to receive the upper reaches of the chains, as represented at one portion thereof at 286. The chains also engage sprockets 287 and 288, respectively, rigidly secured to a shaft 289 journaled on a stationary part of the machine below the table top.

The follower 278 is yieldingly urged toward the molded strip 72 by a coil spring 290 encircling the shaft 289, the end 291 of this coil spring being secured to a stationary part of the machine and its other end operatively connected with the shaft 289 and serving to rotate this shaft in clockwise direction in Fig. 14. To provide for the adjustment of the tension of the spring 290, the end thereof opposite the end 291 is connected with a collar 292 rotatably and slidably mounted on the shaft 289 and having releasable clutch engagement with a collar 293 rigid on the shaft 289, this clutching engagement being provided by a lug 294 on the collar 292 which normally extends into a slot 295 in the collar 293.

The follower 278 thus being positioned opposite the strip sections as the latter are produced by the operations of the cutting mechanism, these sections, represented at 72ª, are caused to be stacked on the table top 263, as shown in Fig. 5, the follower 278 receding in opposition to the action of the spring 290 as the stack of sections increases.

The particular illustrated construction of follower 278 comprises a main body portion 296 of angle shape in cross section at which the follower is attached to the chains 280 and 281. Extending along the upwardly-extending flange-portion 297 of the part 296, and adjustable therealong, is a strip 298 having rearwardly-extending headed studs 299 which project at their reduced portions through elongated slots 300 in the flange 297, thus permitting of the shifting of the strip 298 lengthwise of the machine, whereby the follower may be conditioned for operating in the most desirable way for the stacking of strip-sections of greatly varying lengths. For the shorter lengths of strip-sections, the strip 298 is preferably adjusted to the position shown in Fig. 14. For the longer strip-sections, it is preferably shifted to the right in this figure. A coil spring 301 carried by the body portion 296 and extending through a slot 302 in the flange 297 and engaging at its free end with the strip 298, tends to yieldingly hold the latter in the position shown in the drawings. The shifting of the strip 298 to the right in this figure is against the tension of the spring 301, the strip being held in such shifted position by swinging a dog 303 pivoted at 304 on the flange 298, into a position to engage, and for a stop for, the adjacent stud 299.

As will be understood from the foregoing description, the drive for all of the positively driven parts of the machine is through the drive shaft 85, this shaft being shown as driven by an electric motor 305 shown as mounted on the frame of the machine and driving a belt 306 engaging a pulley 307 rigid with a pinion 308 meshing with a gear 309 keyed to the drive shaft 85.

In the machine shown the electrical heating element 58 is thermostatically controlled to maintain the body 59 of molten metal in the crucible at the desired temperature and provision is made for controlling the amount of current supplied to the throat-heating units 61 and 62 and also for controlling the flow of current to the bottom heating unit 60, the sealing units 63 and 64 and the motor 305. These various controlling means are located in a housing 310 positioned below the bed 32, and, together with the electrical circuits controlled thereby, are illustrated diagrammatically in Fig. 24 to which reference is now made.

The line wires through which the current is supplied, are represented at 311 and 312 with a hand-controlled switch 313 interposed therein.

The heating coil 58 is connected at one end with a wire 314 which is connected, through a fuse 315, with the stationary contact 316 of the switch 313, the other end of the coil 58 being connected with a wire 317 leading to a stationary contact 318 of a self-opening solenoid switch represented at 319, the energizing coil of this switch being represented at 320 and its core at 321, the core carrying a bar 322 to which three contacts 323, 324 and 325 are connected, these contacts cooperating with the contact 318 and with stationary contacts 326 and 327, respectively.

The wire 314 is connected with one end of a protective resistance coil 328, the other end of which connects with a wire 329 connected with one end of the solenoid coil 320 and with a wire 330 which connects with a contact 331 of a thermostat 332 of a conventional form submerged at its lower end in the body 59 of the molten metal in the crucible. The contact 331 is carried by an arm 333 pivoted at 334 to a stationary part of the thermostat and engageable by the ex-

pansion bar 335 of the thermostat, the arm 333 cooperating with a contact-arm 336 of the thermostat and pivoted at 337. The arm 336 is positioned between the contact 331 and a stationary contact 338, a spring 339 yieldingly forcing the arm 336 toward the contact 338.

The other end of the solenoid coil 320 connects, by a wire 340 with the contact arm 336 and, by a wire 341, with the stationary contact 326. The contact 338 of the thermostat connects, by a wire 342, with the other stationary contact 343 of switch 313, and by a wire 344 with the stationary contact 327, a fuse 345 being interposed in the wire 342.

When the temperature of the metal in the crucible lowers to a certain degree the contacts 336 and 338 of the thermostat engage thereby causing the coil 320 to be energized which closes the solenoid switch 319 and current from the main line wires flows through the heating coil 58; the circuits thus established being as follows: Line wire 311, switch 313, wire 314, protective resistance 328, wire 329, coil 320, wire 340, thermostat arm 336, contact 338, wire 342, switch 313, and wire 312. By establishing this circuit the coil 320 is energized and moves the contacts 323, 324 and 325 into engagement, respectively, with the contacts 318, 326 and 327, whereupon the current flows through wire 311, switch 313, wire 314, heating coil 58, wire 317, bar 322, wires 344 and 342, switch 313, and wire 312. The closing of the switch as stated also establishes a holding circuit for the switch 319 for holding it closed following the disengagement of the thermostat arm 336 with the contact 338 and until the arm 336 engages the contact 331, this circuit being as follows: Wire 311, switch 313, wire 314, resistance coil 328, wire 329, coil 320, wire 340, wire 341, contacts 326 and 324, bar 322, contacts 325 and 327, wires 344 and 342, switch 313, and wire 312.

When the temperature of the metal in the crucible rises to a certain degree the contact arm 336 of the thermostat and the contact 331 engage thereby causing the switch 319 to open and the heating coil 58 to become deenergized, the circuits which are established upon the conditioning of the thermostat as just stated being as follows: wire 311, switch 313, wire 314, coil 328, wire 330, contact 331, arm 336, wire 340, wire 341, contacts 326 and 324, bar 322, contacts 325 and 327, wires 344 and 342, switch 313, and wire 312. The circuit just described thereby causes the coil 320 to be short-circuited whereupon the switch 319 automatically opens and breaks the circuit through the heating coil 58.

The switch 319 remains open until the thermostat arm 336 again engages with the contact 338 upon the lowering of the temperature of the metal to a certain degree whereupon the switch 319 is again operated to close the circuit in which the heating coil 58 is interposed.

Referring now to the controlling means for the motor 305, the bottom heating element 60, the side throat-heating elements 61—62, and the sealing elements 63 and 64; the switch controlling the motor is represented at 400, the switch for the bottom heating element at 401, the switch for the sealing elements at 402, and three switches controlling the amount of current flowing to the elements 61 and 62 at 403, 404 and 405, these last-referred-to switches being for high, medium and low heating of this element.

Referring first to the circuit controlling the motor 305, the wiring therefor includes wires 406 and 407 connected through the switch 313 with the line wires 311 and 312, respectively. The wire 406 connects with one of the stationary contacts of switch 400 and the wire 407 with the other stationary contact thereof, the two arms of the switch being connected with the motor by wires 408 and 409, respectively. Thus by closing switch 400 the current is supplied to motor 305. The wiring for the circuit controlling the bottom heating unit 60 comprises the wire 407, a wire 410 connected with wire 407 and with a wire 411 connected with the arm of the switch 401, a wire 412 connected with the stationary contact of switch 401 and with one end of the resistance element of the coil, a wire connected with the other end of this coil and with a bar 413, and a wire 414 connecting the bar 413 with bar 415 connected by a wire 416 with the wire 406. Thus when the switch 401 is closed current from the main line traverses wires 407, 410, 411, switch 401, wire 412, heating coil 60, bar 413, wire 414, bar 415, and wire 416 to wire 406.

The wiring for the circuit controlling the heating units 63 and 64 comprises the wires 407, 410 and 411, the switch 402, a wire 417 connected with the stationary contact of switch 402 and with a wire 418 connected at one end with one end of unit 63 and at its other end with one end of unit 64; a wire 419 connecting the other end of unit 63 with the bar 413 and a wire 420 connecting the other end of unit 64 with the bar 415. Thus when switch 402 is closed current from the main line traverses wires 407, 410 and 411, switch 402, wire 417, wire 418, unit 63, wire 419, bar 413, wire 414, bar 415, wire 416, and wire 406; and also traverses wire 418, to unit 64, wire 420, bar 415, and wires 416 and 406, the units 63 and 64 being thus in parallel, whereby both of said units are energized.

The wiring for the circuit controlling the heating units 61 and 62 comprise the wires 407, 410, a wire 421 connected with each of the arms of switches 403, 404 and 405, a wire

422 connected with the stationary contact of switch 405 and connected with one end of each of the two coils 423 and 424 of a resistor, the other ends of which are connected with a wire 425 which is connected with one end of each of two coils 426 and 427 of another resistor and with the stationary contact of switch 404, the other ends of the coils 426 and 427 being connected with a wire 428 which connects at one end with the stationary contact of switch 403 and at its other end with a wire 429 connected at one end with one end of unit 61 and at its other end with one end of unit 62. The other end of unit 61 is connected with the bar 413 by a wire 430 and the other end of unit 62 with bar 415 by a wire 431.

Upon closing switch 405 the current traverses wires 407, 410 and 421, switch 405, wire 422, coils 423 and 424, and 426 and 427, wire 428, wire 429, unit 61, wire 430, wire 414, bar 415, and wires 416 and 406, current also traversing wire 429, unit 62, wire 431, bar 415, and wires 416 and 406, units 61 and 62 thus being in parallel. The current thus traverses the resistors, comprising the pair of coils 423, 424, and pair of coils 426 and 427, which pairs are thus in series and current for heating the units 61 and 62 to a low temperature is supplied thereto.

If the switch 404 is closed, instead of switch 405, the current traverses wires 407, 410 and 421, switch 404, wire 425, coils 426 and 427, wire 428, thence through the units 61 and 62 and back to wire 406 as explained in connection with the closing of switch 405. The current thus traverses coils 426 and 427 only of the resistors and consequently units 61 and 62 are heated to a higher degree than where the switch 405 only is closed.

If switch 403 is closed instead of either switch 404 or 405, the current traverses wires 407, 410 and 421, switch 403, wire 428, and thence passes through the heating units 61 and 62, and then to the wire 406. All of the coils of the resistors are thus cut out of circuit and the full current is supplied to the heating units 61 and 62 to heat them to a relatively high temperature.

While I have illustrated and described a particular construction embodying my invention I do not wish to be understood as intending to limit it thereto as the same may be variously modified and altered without departing from the spirit of my invention

What I claim as new, and desire to secure by Letters Patent, is:

1. In a machine of the character described, the combination of a stationary die in which the continuous strip is to be formed, a crucible having an outlet in communication with said die, electrical means for heating said crucible and maintaining the metal from which the strip is to be formed, in molten condition to the point at which it becomes solidified in said die, and means for causing the formed strip to advance through said die.

2. In a machine of the character described, the combination of a die in which the continuous strip is to be formed, a crucible having a throat-portion through which the metal flows to said die, an electrical heating element for heating the metal in said crucible, an electrical heating element extending along the bottom of said throat-portion, electrical heating elements located at opposite sides of said throat-portion adjacent said die, and means for causing the formed strip to advance through said die.

3. In a machine of the character described, the combination of a die in which the continuous strip is to be formed, a crucible having a throat-portion through which the metal flows to said die, an electrical heating element for heating the metal in said crucible, an electrical heating element extending along the bottom of said throat-portion, electrical heating elements located at opposite sides of said throat-portion adjacent said die, means for regulating the current to said last-referred-to heating elements, and means for causing the formed strip to advance through said die.

4. In a machine of the character described, the combination of a die in which the continuous strip is to be formed, a crucible having a throat-portion through which the metal flows to said die, an electrical heating element for heating the metal in said crucible, an electrical heating element extending along the bottom of said throat-portion, electrical heating elements located at opposite sides of said throat-portion adjacent said die, means for regulating the current to said last-referred-to heating elements comprising a plurality of resistors of fixed resistance, means for selectively interposing said resistors in the circuit, and means for causing the formed strip to advance through said die.

5. In a machine of the character described, the combination of a crucible having a throat-portion terminating in an outlet, a housing having an opening therethrough and communicating at one end with said outlet, a die in said housing and in which the strip is to be formed, electrical means for heating said crucible and maintaining the metal from which the strip is to be formed, in molten condition to the point at which it becomes solidified in said die, said means comprising heating elements at opposite sides of said throat-portion and lapping the adjacent end of said housing, and means for causing the formed strip to advance through said die.

6. In a machine of the character described, the combination of a crucible having a throat-portion terminating in an outlet, a housing having an opening therethrough

and communicating at one end with said outlet, a die in said housing and in which the strip is to be formed, electrical means for heating said crucible and maintaining the metal from which the strip is to be formed, in molten condition to the point at which it becomes solidified in said die, said means comprising heating elements at opposite sides of said throat-portion and a heating element at the bottom of said throat-portion, all of said heating elements lapping the adjacent end of said housing, and means for causing the formed strip to advance through said die.

7. In a machine of the character described, the combination of a crucible having an outlet opening through an outwardly flaring recess in the exterior surface of the crucible, a housing having an opening therethrough and formed with a tapering boss at which it fits into said recess to produce a tight joint, said outlet and opening being in registration, and a die in said housing and in which the strip is to be formed.

8. In a machine of the character set forth, the combination of a stationary die in which the continuous strip is to be formed, a housing in which said die is located in spaced relation thereto, a crucible containing a passage through which molten metal is supplied to said die, and a valve controlling the supplying of sealing molten metal to the space between said housing and die.

9. In a machine of the character set forth, the combination of a die in which the continuous strip is to be formed, a housing in which said die is located in spaced relation thereto, a crucible containing an outlet passage in communication with said die, means for pumping molten metal from said crucible into said outlet passage, said crucible containing an auxiliary passage between said pump and die which opens into said outlet passage and is in communication with the molten metal in said crucible, and a valve controlling the flow of metal through said auxiliary passage.

10. In a machine of the character described, the combination of a die in which the continuous strip is to be formed, a crucible from which the metal for forming the strip is supplied to said die, and means for engaging the formed strip and intermittently advancing it comprising a slide member, a clamp member cooperating with said slide member for clamping the strip, said members being relatively movable, an upwardly extending driving shaft, a cam on said shaft and a depending pin on said slide and engaging said cam for actuating said slide-member.

11. In a machine of the character described, the combination of a die in which the continuous strip is to be formed, a crucible from which the metal for forming the strip is supplied to said die, and means for engaging the formed strip and intermittently advancing it comprising a slide member, a clamp-member cooperating with said slide member for clamping the strip, said members being relatively movable, a drive shaft extending lengthwise of the machine, an upwardly extending shaft driven from said drive shaft, a cam on said second-named shaft and a depending pin on said slide engaging said cam for actuating said slide member.

12. In a machine of the character described, the combination of a die in which the continuous strip is to be formed, a crucible from which the metal for forming the strip is supplied to said die, and means for engaging the formed strip and intermittently advancing it comprising a slide member having a wedge surface, means for reciprocating said slide member, a wedge-block cooperating with said wedge surface and movable with said slide member and movable into and out of clamping engagement with the strip, a rock shaft on said slide member and having eccentric connection with said wedge-block, means tending to force said wedge-block into clamping engagement with the strip, and means cooperating with said rock shaft for rendering said third-named means ineffective during a portion of the movement of said slide member.

13. In a machine of the character described, the combination of a die in which the continuous strip is to be formed, a crucible from which the metal for forming the strip is supplied to said die, and means for engaging the formed strip and intermittently advancing it comprising a slide member having a wedge surface, means for reciprocating said slide member, a wedge-block cooperating with said wedge surface and movable with said slide member and movable into and out of clamping engagement with the strip, a rock shaft on said slide member and having eccentric connection with said wedge-block, means tending to force said wedge-block into clamping engagement with the strip, said rock shaft having an eccentric, and a surface stationary relative to said eccentric and along which said eccentric is movable in the actuation of said slide member and by which said eccentric is operated to rock said rock shaft to a position in which said third-named means are rendered ineffective.

14. In a machine of the character described, the combination of a die in which the continuous strip is to be formed, a crucible from which the metal for forming the strip is supplied to said die, and means for engaging the formed strip and intermittently advancing it comprising a slide member, means for reciprocating said slide member, said slide member having a section adjustable therealong in a path extending at an angle to the plane of movement of said

strip, a wedge clamp member cooperating with said slide member for clamping the strip, means for maintaining said section in adjusted position, and means for actuating said slide-member.

15. In a machine of the character described, the combination of a die in which the continuous strip is to be formed, a crucible from which the metal for forming the strip is supplied to said die, and means for engaging the formed strip and intermittently advancing it comprising a slide member, means for reciprocating said slide member, said slide member having a section adjustable therealong in a path extending at an angle to the plane of movement of said strip, a wedge clamp member cooperating with said slide member for clamping the strip, abutments at opposite ends of said section, gauge blocks adapted to be selectively interposed between said section and said abutments in the adjustment of said section on said slide member, and means for actuating said slide member.

16. In a machine of the character described, the combination of a die in which the continuous strip is to be formed, a crucible having an outlet-passage communicating with said die, a pump for pumping the metal from the crucible into said die, an oil supply in communication with the inlet of said die, said crucible having a passage opening into said outlet passage between said pump and die and communicating with the body of metal in the crucible and a valve in said second-named passage for varying the suction produced at the inlet of said die by the pump on its suction stroke and thereby varying the amount of oil supplied to said die.

17. In a machine of the character set forth, the combination of a die in which the continuous strip is to be formed, a crucible containing an outlet passage in communication with said die, means for pumping molten metal from said crucible into said outlet passage, said crucible containing an auxiliary passage between said pump and die which opens into said outlet passage and is in communication with the molten metal in said crucible, and a valve controlling the flow of metal through said auxiliary passage.

18. In a machine of the character set forth, the combination of a die in which the continuous strip is to be formed, a crucible containing an outlet passage in communication with said die, a reciprocating pump for pumping molten metal from said crucible into said outlet passage, an oil supply in communication with the inlet of said die, said crucible containing an auxiliary passage between said pump and die which opens into said outlet passage and is in communication with the molten metal in said crucible, and a valve controlling the flow of metal through said auxiliary passage, whereby the stroke of said pump may be lengthened upon opening said valve.

19. In a machine of the character set forth, the combination of a stationary die in which the continuous strip is to be formed, a housing in which said die is located in spaced relation thereto, a crucible containing a passage through which molten metal is supplied to said die, said crucible containing an auxiliary passage in communication with said die and with the molten metal in said crucible, and a valve controlling the supplying of sealing molten metal through said auxiliary passage to the space between said housing and die.

20. In a machine of the character set forth, the combination of a die in which the continuous strip is to be formed, a crucible containing a passage through which molten metal is supplied to said die, the machine containing an auxiliary passage communicating with the lower portion of said crucible and through which the contents thereof may be drained and a valve controlling the flow of metal from said crucible through said auxiliary passage.

21. In a machine of the character set forth, the combination of a die in which the continuous strip is to be formed, a crucible containing a passage through which molten metal is supplied to said die, a reciprocating pump having a piston for forcing the metal from the crucible through said passage, said crucible containing an auxiliary passage between said pump and die and in communication with the molten metal in said crucible and through which the metal in the pump may be withdrawn for permitting insertion and withdrawal of said piston without resistance by compression and suction, respectively, and a valve controlling the flow of metal through said auxiliary passage.

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