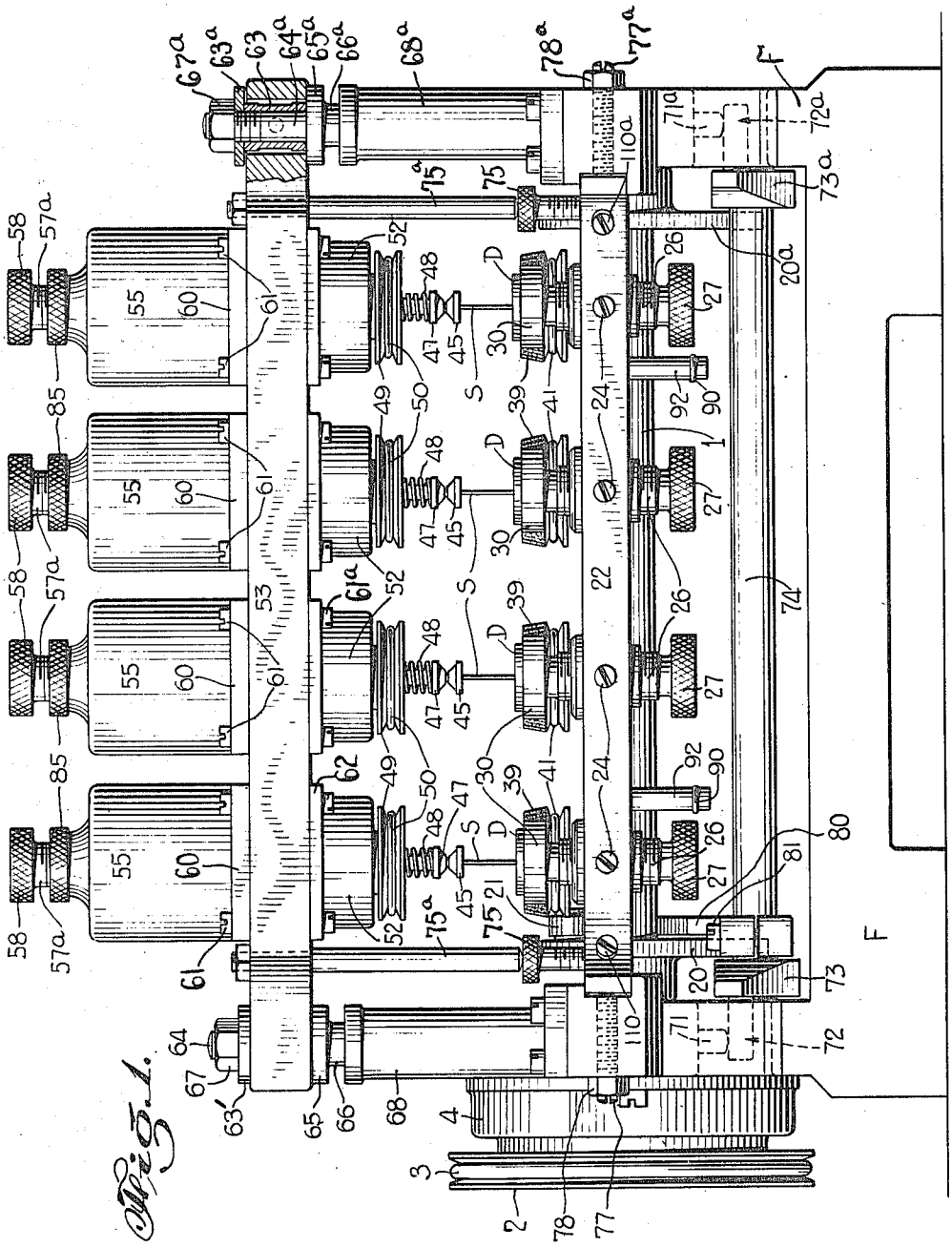
Sept. 26, 1933. A. SIMONS 1,928,440

MACHINE FOR SHAPING WIRE DRAWING DIES

Filed June 3, 1931 8 Sheets-Sheet 1



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MACHINE FOR SHAPING WIRE DRAWING DIES

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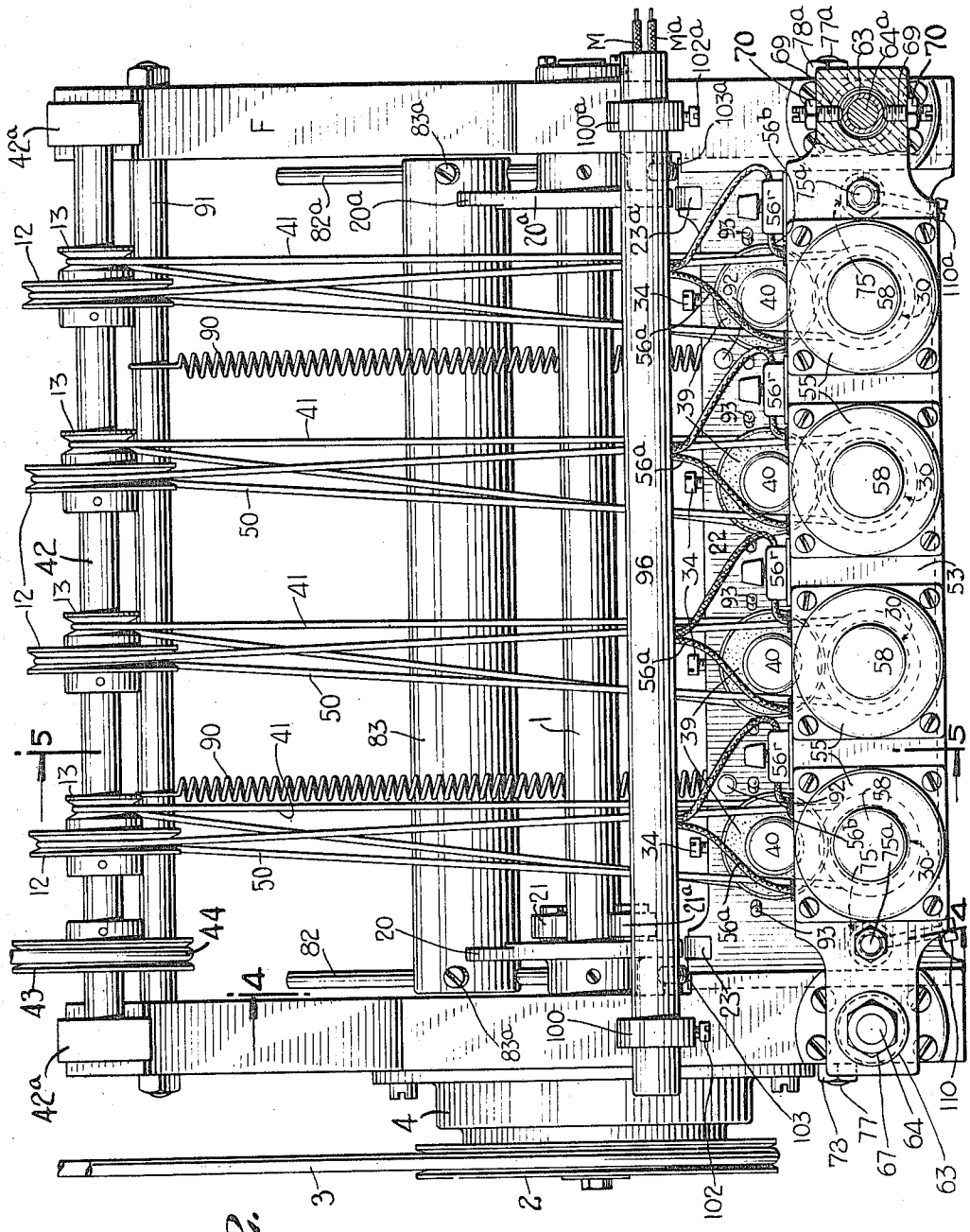


Fig. 2.

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MACHINE FOR SHAPING WIRE DRAWING DIES

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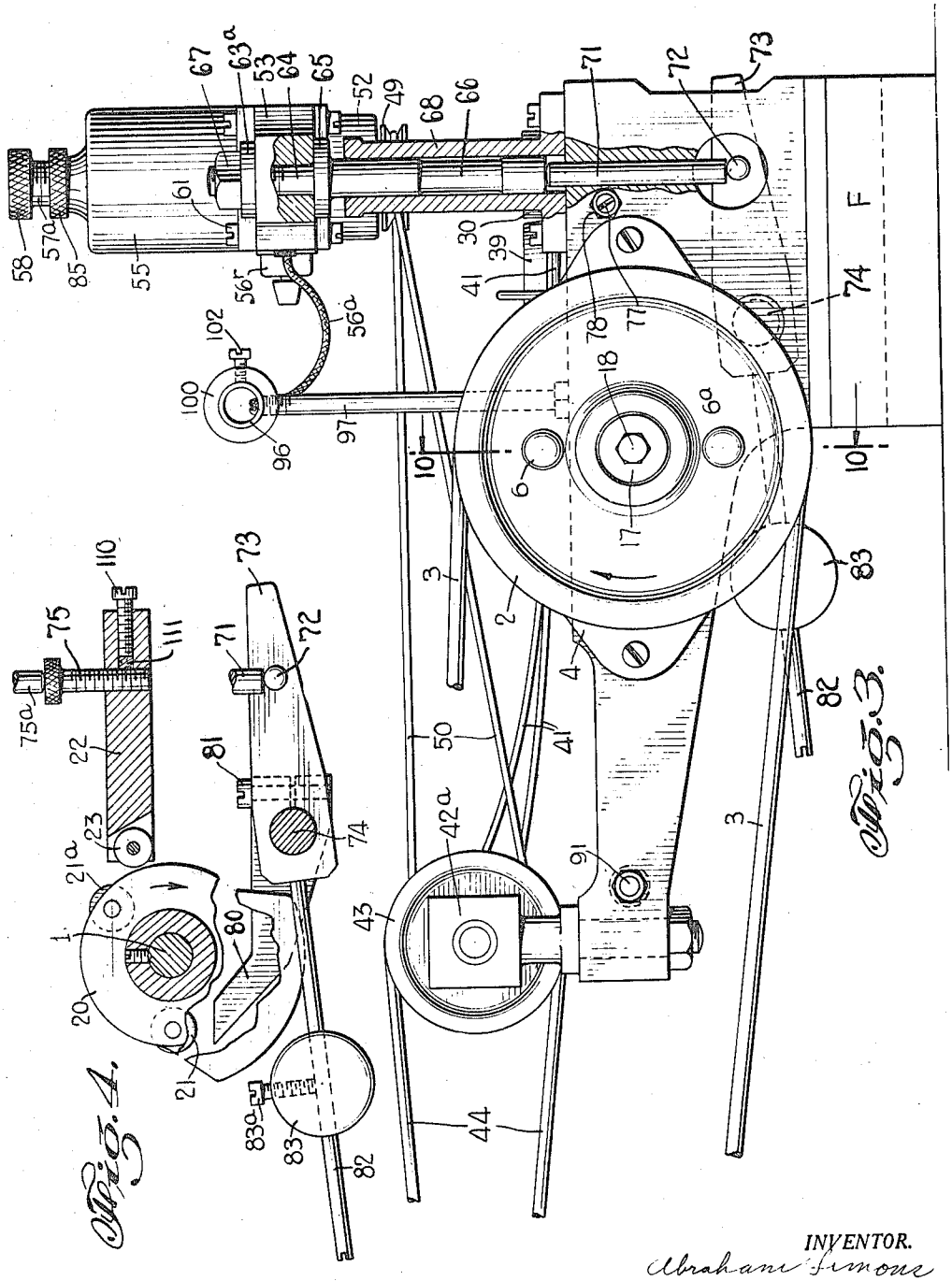


Fig. 3.

Fig. 4.

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MACHINE FOR SHAPING WIRE DRAWING DIES

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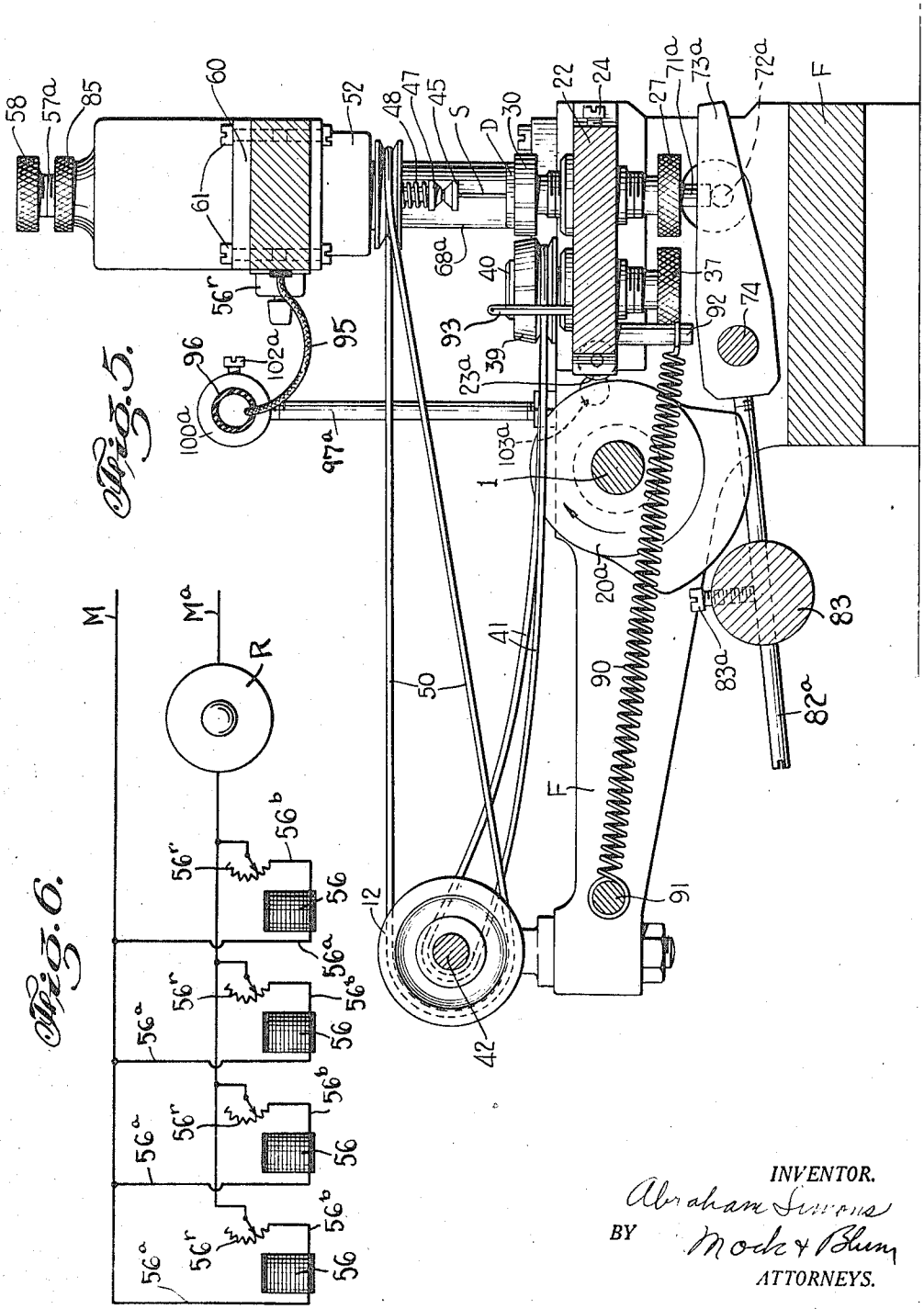


Fig. 5.

Fig. 6.

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MACHINE FOR SHAPING WIRE DRAWING DIES

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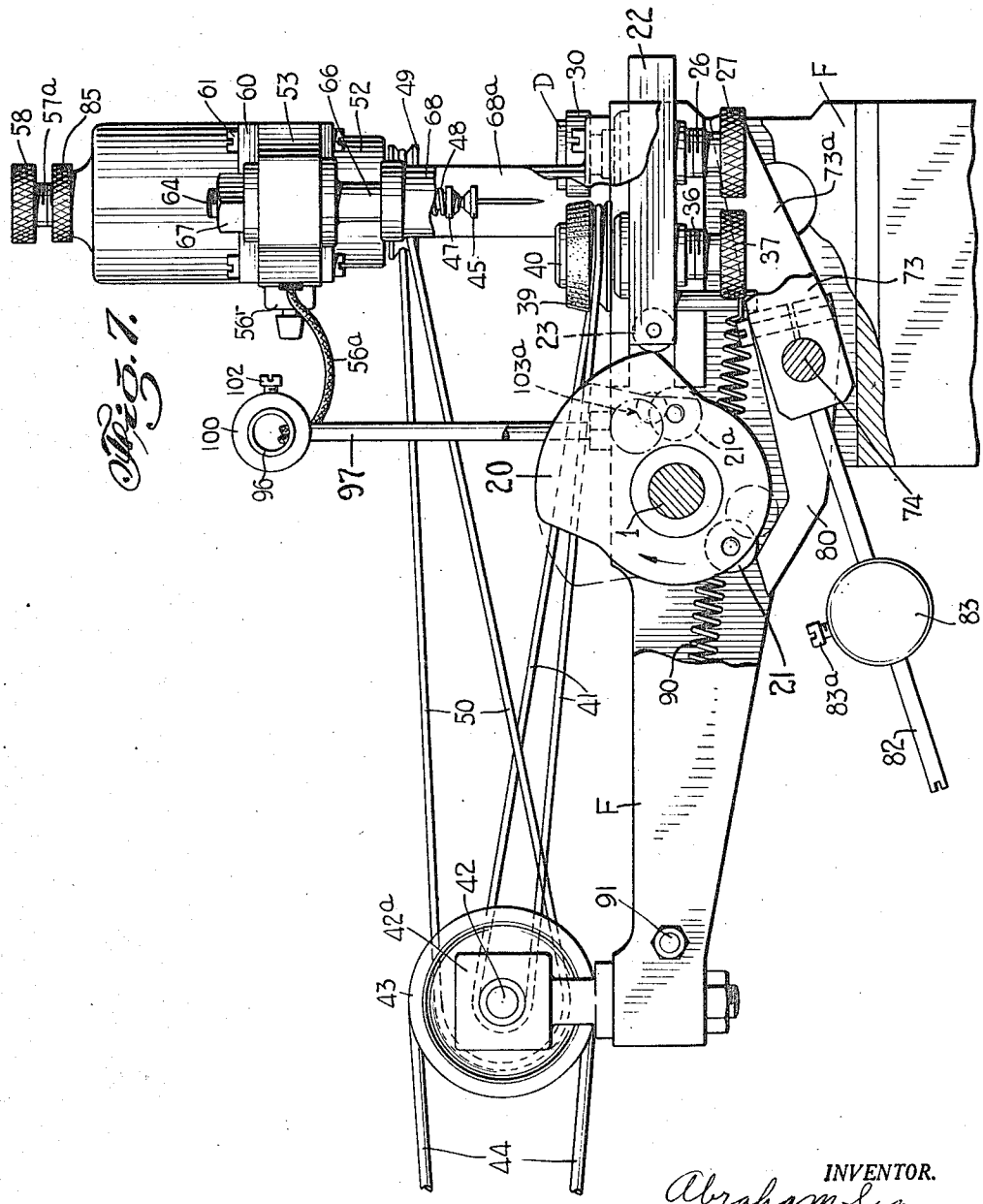


Fig. 7.

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MACHINE FOR SHAPING WIRE DRAWING DIES

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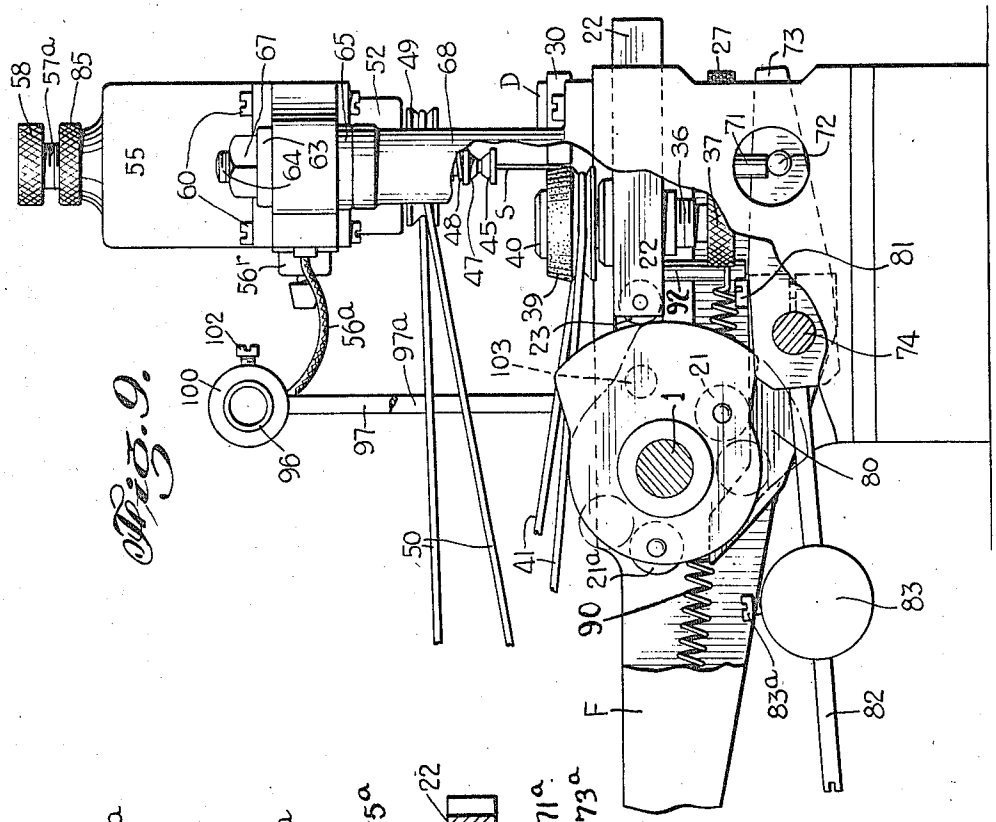


Fig. 9.

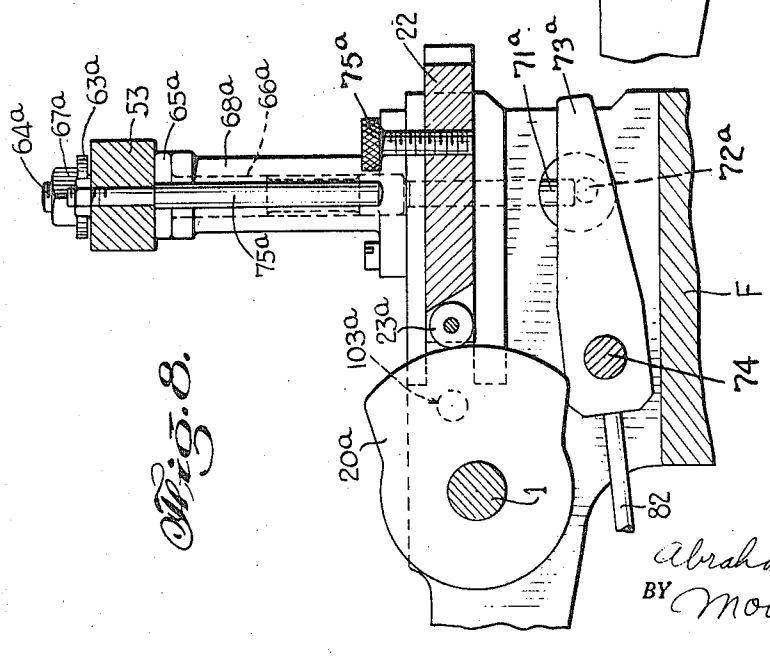


Fig. 8.

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MACHINE FOR SHAPING WIRE DRAWING DIES

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Fig. 11.

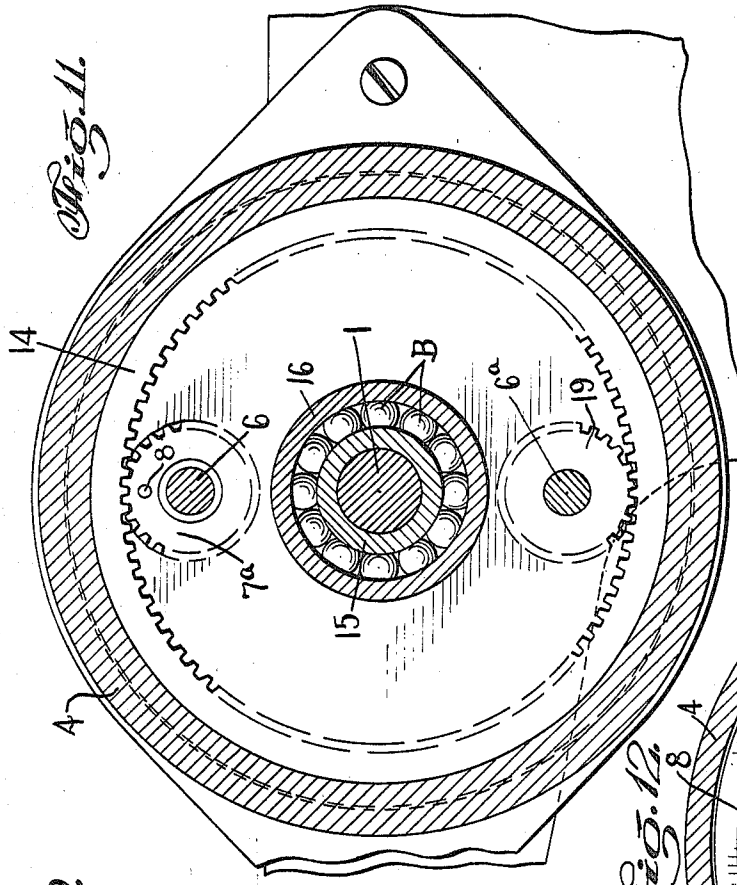


Fig. 13.

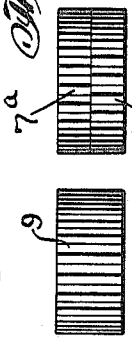


Fig. 13a.

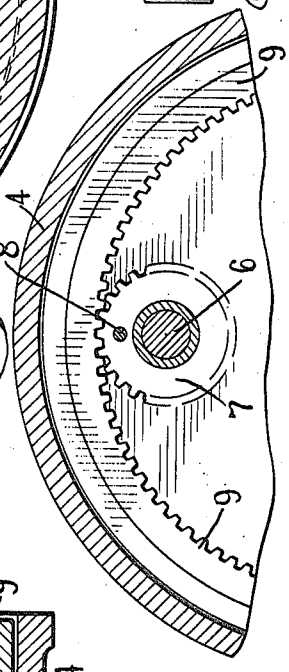
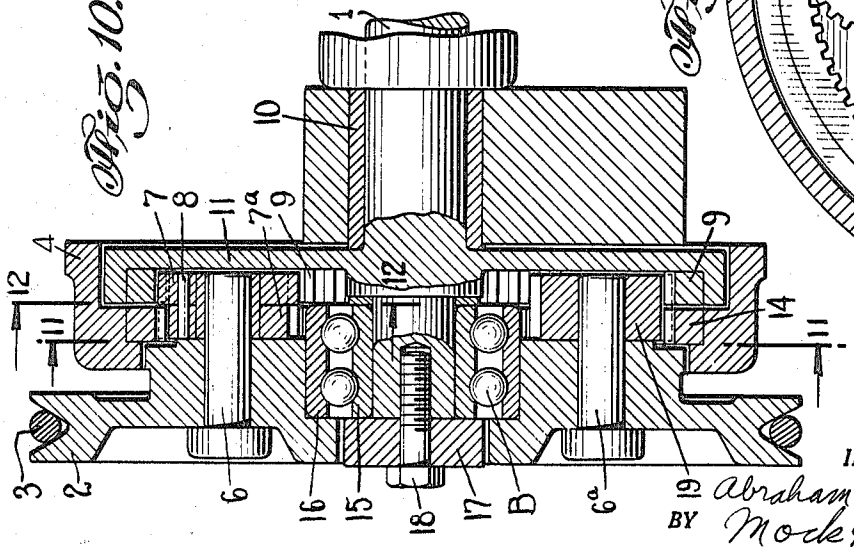


Fig. 12.

Fig. 10.



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MACHINE FOR SHAPING WIRE DRAWING DIES

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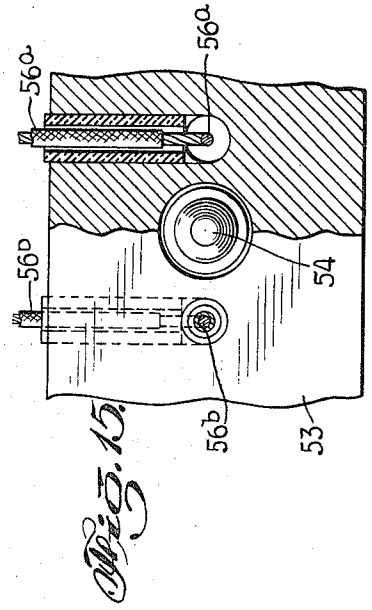


Fig. 15.

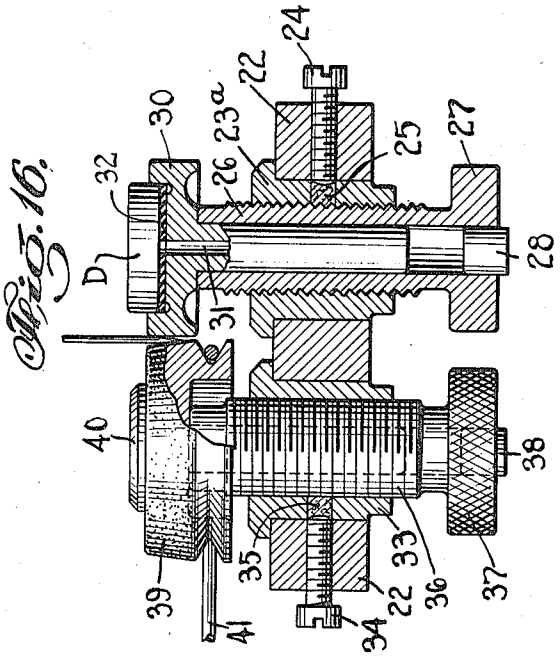


Fig. 16.

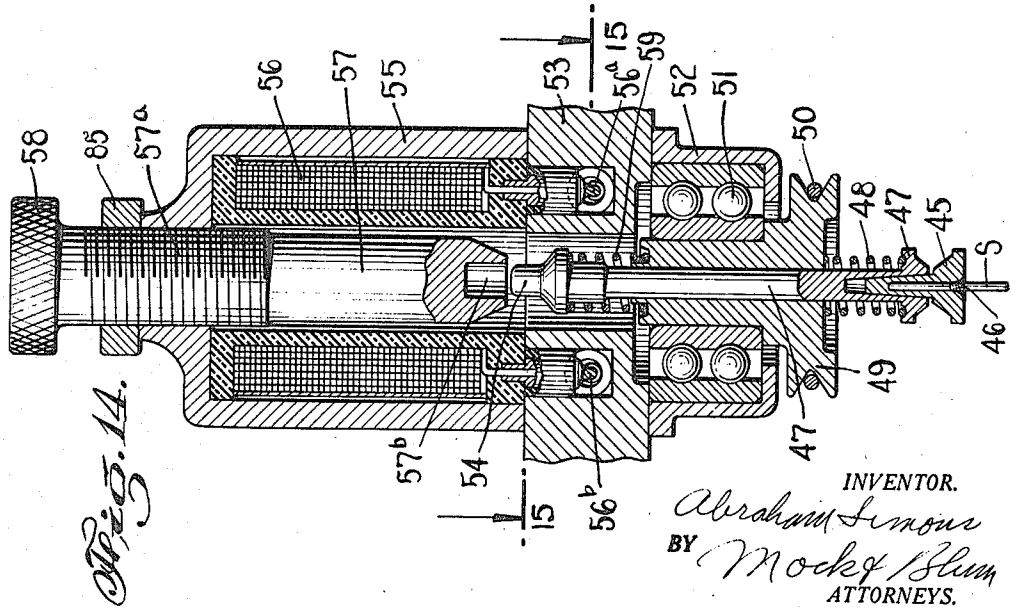


Fig. 14.

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Patented Sept. 26, 1933 1,928,440

UNITED STATES PATENT OFFICE

1,928,440

MACHINE FOR SHAPING WIRE DRAWING DIES

Abraham Simons, New York, N. Y.

Application June 3, 1931. Serial No. 541,795

13 Claims. (Cl. 51—31)

My invention relates to a new and improved machine for grinding wire drawing dies.

One of the objects of my invention is to provide an improved and automatic machine for forming the bores of wire drawing dies.

Another object of my invention is to provide a machine whereby the grinding needles are automatically ground, so that said needles are kept in proper condition at all times.

Another object of my invention is to provide a machine which shall have large capacity and which shall materially lower labor cost, and which shall replace the skilled hand labor which is now necessary for this class of work.

Other objects of my invention will be set forth in the following description and drawings, which illustrate a preferred embodiment of my invention, it being understood that the above general statement of the objects of my invention is intended to generally explain the same and not to limit it in any manner.

Fig. 1 is a front elevation.

Fig. 2 is a top plan view.

Fig. 3 is a front end elevation.

Fig. 4 is a sectional view on the line 4—4 of Fig. 2.

Fig. 5 is a sectional view on the line 5—5 of Fig. 2.

Fig. 6 is a diagrammatic view of the electrical control circuit.

Fig. 7 is a view similar to Fig. 5, but showing the parts in a different position.

Fig. 8 is a partial rear end elevation.

Fig. 9 is a partial view similar to Fig. 7, but showing the parts in a different position.

Fig. 10 is a sectional view on the line 10—10 of Fig. 3.

Fig. 11 is a sectional view on the line 11—11 of Fig. 10.

Fig. 12 is a sectional view on the line 12—12 of Fig. 10.

Fig. 13 is a detail elevation of certain drive gears.

Fig. 13*a* is a bottom view of one of the planetary gears.

Fig. 14 is a sectional view, partially in elevation, showing the mechanism for actuating the grinding needle.

Fig. 15 is a sectional view on the line 15—15 of Fig. 14.

Fig. 16 is a detail sectional view, partially in elevation, showing the mechanism for holding the blank and for grinding the needle.

The machine has a suitable frame F in which a main drive shaft 1 is mounted in suitable bearings, as shown in Fig. 2. The main drive shaft 1 is operated by means of a drive pulley 2, which is actuated by a belt 3. The drive pulley 2 operates the main drive shaft 1 by means of a reduction gear system. This may be of any suitable type, but I prefer to use an improved planetary type.

As shown in Fig. 10, the reduction gears are located within a stationary casing or gear box 4. Likewise, and as shown in Fig. 10, the pulley 2 is provided with auxiliary shafts 6 and 6*a* which pass through suitable openings in said pulley. Gears 7 and 7*a* are mounted upon the planetary shaft 6 and these gears 7 and 7*a* are connected by means of a pin 8, so that these planetary gears turn in unison upon the planetary shaft 6. For convenience, the planetary shaft 6 may be designated as the first planetary shaft, and the assembled gears 7 and 7*a* may be designated as the first planetary gear unit.

The planetary shafts 6 and 6*a* have a drive fit in the pulley 2, so that said planetary shafts 6 and 6*a* are not revoluble with respect to pulley 2. Any desired means may be utilized for holding the planetary shafts 6 and 6*a* on the pulley 2, so that they do not turn about their own axes, and merely serve to hold revoluble planetary gear units.

As shown in Fig. 13, the gears 7 and 7*a* have the same number of teeth, but the teeth of one of these gears are staggered with respect to the teeth of the other of said gears. The main drive shaft 1 is provided with a sun gear 9, which is either integral therewith, or is suitably connected thereto.

The main drive shaft 1 is also provided with a bushing 10 and said main drive shaft 1 is also provided with a flange 11 which may either be integral therewith, or be suitably connected thereto.

The gear 7 meshes with the teeth of the sun gear 9 and the gear 7*a* meshes with an internal gear 14, which has a drive fit within the stationary casing 4 or is suitably connected to said casing 4.

As shown in Fig. 12, the gear 9 is also an internal gear, and said internal gear 9 has one more tooth than the internal gear 14. For example, the internal gear 9 may have ninety-five (95) teeth, and the internal gear 14 may have ninety-six (96) teeth. Since each tooth has a corresponding space, the internal surface of gear 9 may be considered as being divided into one hundred ninety (190) parts, and the internal surface of gear 14 may be considered as being

divided into one hundred ninety-two (192) parts. Assuming that the bottom teeth of gears 9 and 14 are in alignment, the top tooth of gear 9 is aligned with a top space of gear 14.

A planetary gear 19 is mounted upon the planetary shaft 6*a*, and this planetary gear 19 is in mesh with the internal gears 14 and 9, since the teeth of said gears 19 are aligned at this point of meshing.

The pulley 2 is provided with a ball-bearing upon the shaft 1. For this purpose the main drive shaft is provided with a bushing 15 and the balls B are confined between this bushing 15, and a bushing 16 with which the pulley 2 is provided. The bushings 15 and 16 act as the ball races in the ordinary manner.

In order to confine the balls B in position, the parts of this ball-bearing are also held in assembled relation by means of a washer 17 which is held in position by means of a screw 18, said screw 18 entering a suitably threaded recess in the adjacent end of the main drive shaft 1.

This reduction gear drive operates to drive the main drive shaft 1 at about one per cent of the speed of the pulley 2, so that the pulley 2 turns one hundred times for each revolution of the main drive shaft 1. While I do not wish to limit myself to this particular ratio, this will serve to indicate the relatively slow drive of the main drive shaft 1. When the pulley 2 is revolved, the first planetary gear unit 7 and 7*a* is rotated about the central axis of the main drive shaft 1, and the planetary gear 19 (which may be designated as the second planetary gear unit) is also rotated in a similar manner.

Since the gear 14 is held stationary, this rotating movement causes the respective planetary gear units to revolve about the first planetary shaft 6, and the second planetary shaft 6*a*. Since the internal gear 14 has one more tooth than the internal gear 9, the effect is to produce a very slow turning of the main drive shaft 1.

Due to the difference in the number of teeth between the internal gears 9 and 14, it is desirable to offset the teeth of the gears 7 and 7*a*, as shown in Fig. 13, in order to permit said gears 7 and 7*a* to respectively mesh with the internal gears 9 and 14.

As shown in Fig. 2, the drive shaft 1 is provided with cams 20 and 20*a*.

As shown in Fig. 7, the cam 20 is provided with rollers 21 and 21*a* which are revolubly connected thereto.

As shown in Fig. 7, the cam 20 serves to reciprocate a bridge 22, which can reciprocate in a horizontal plane. Said bridge 22 is provided with a roller 23 which contacts with the face of cam 20. The cam 20*a* is like the cam 20, and its face cooperates with a roller 23*a* of the bridge 22.

As shown in Figs. 1 and 7, this horizontally reciprocating bridge 22 carries the supports for holding the die-blanks, and said bridge 22 also carries the mechanism for grinding the needles.

As shown in Fig. 16, the bridge 22 has a series of inserts 23*a* which are held in position by means of set-screws 24. The inserts 23*a* are provided with blocks 25 which are made of leather or similar material, so that the set-screws 24 hold the inserts 23*a* firmly in position.

Said inserts 23*a* are internally threaded and serve as mounts for the vertically adjustable supports 26. These supports have knurled heads 27, so that said supports 26 can be vertically adjusted by means of said knurled heads 27. Said supports 26 have central vertical bores, and the bottoms of said bores are closed in an air-tight manner by means of plugs 28. Said plugs 28 may have a drive fit within the lower ends of said bores, or they can be releasably held in position in any suitable manner. The blank holder 30 has a bore 31 and it is also provided with an insert 32 which is made of rubber or other soft material. This insert 32 has an opening which registers with the bore 31.

The blank D rests upon the insert 32. When the holder 30 is inserted into the position shown in Fig. 16, the bore 31 and the plug 28 serve to produce a dash-pot effect. The grinding device for each grinding needle includes an insert 33 which is also held in position in the bridge 22, by means of a set-screw 34, a block 35 of leather or other yieldable material being provided in the insert 33. The insert 33 is also internally threaded and a vertical grinder holder 36 is adjustably held within the insert 33. This grinder holder 36 has a knurled head 37, similar to the knurled head 27. The grinder holder 36 is also hollow and the lower end of its central bore is enclosed by a plug 38, which is similar to the plug 28.

The member 36 has a bearing portion at the top thereof, which revolubly supports a combined pulley and tapered grinding wheel 39. This member 39 has a groove which receives a driving belt 41, and it is held in position by means of a member 40.

As shown in Fig. 2, the belts 41 are driven by means of pulleys 13 which are located upon an auxiliary shaft 42 having a pulley 43 which is driven by means of a belt 44.

The die blanks D are shaped by means of grinding needles S.

As shown in Fig. 14, each needle S has a drive fit in a holder 45, this drive fit being made more secure by means of a coating 46, which is made of shellac or other fusible material. This fusible material is poured into the opening provided for this purpose in the holder 45, and when it solidifies, it serves to hold the needle S firmly within its needle holder 45. The needle holder 45 has a drive fit in the head of a plunger 47. This plunger 47 has a coil spring 48 which yieldingly holds said plunger 47, in the position shown in Fig. 14.

The plunger 47 can vertically reciprocate in a revoluble block 49, which is turned by means of a belt 50. The plunger 47 and the block 49 turn in unison, a suitable slot and key connection being provided for this purpose.

The revoluble block 49 is supported by means of a ball-bearing 51 in a holder 52. This holder 52 is bolted or otherwise suitably connected, to a vertically movable bar 53.

When the bar 53 is moved up or down, the holder 52 moves in unison therewith, and the coil-casing 55 also moves in unison with said bar 53, the members 55 and 53 being suitably connected by bolts or the like.

For example, and as shown in Fig. 1, the members 53 and 55 may be connected by bolts 61, passing through flanges 60 of the members 55, and the members 52 and 53 may be connected by means of bolts 61 passing through flanges 62 of said members 52.

Each coil-casing 55 is provided with an electromagnetic coil 56 having a vertically adjustable core 57. Each said core 57 has an upper threaded part 57*a* which passes through an internally threaded head 85 of the casing 55. Each core 57 has an outer knurled head 58 by means of which it can be vertically adjusted. When the coil 56

is energized by sending a current through the same, the core 57 is magnetized, so that the plunger 47 is raised, and the head 54 of said plunger 47 enters the recess 57*b* of the core 57.

A second coil spring 59 is provided between the block 49 and the upper part of the plunger 47, and these compression springs 59 and 48 act in opposite directions, so that the plunger 47 can be delicately balanced by means of said springs 48 and 59, so that it can be raised by a relatively slight magnetic force.

Each coil 56 is connected to wires 56*a* and 56*b*, which carry the electric current thereto.

Since the passage of current through said coils 56 would heat the bar 53 by means of conduction through the metal casings 55, the bar 53 is mounted so that it can expand without binding.

The bar 53 is raised and lowered by means of plungers 66 and 66*a*, having heads 65 and 65*a*, which abut the underside of the bar 53. The heads 65 and 65*a* have extensions which pass through bushings 63, said bushings 63 fitting loosely within suitable openings provided in said bar 53. One of these extensions, namely, the member 64*a*, is shown at the right-hand side of Fig. 1, and it has a loose fit within the corresponding bushing.

Washers 63*a* and 63′ are provided at the tops of said bushings, and these washers are spaced from the upper side of the bar 53.

These parts are held assembled by means of nuts 67 and 67*a* which engage the threads at the tops of the extensions 64 and 64*a*.

As shown in Fig. 2, the bushings 63 and 63*a* are held in suitable spaced relationship to the corresponding openings in the bar 53 by means of screws 69 and nuts 70. The plungers 66 and 66*a* move up and down within casings 68 and 68*a*. The construction of said plungers 66 and 66*a* is illustrated in Fig. 3, these plungers being of like construction. For example, the plunger 66 has a central portion of reduced diameter and said plunger 66 is actuated by means of a rod 71 which rests upon the pin 72 of a lever 73 mounted upon a rock-shaft 74.

As shown in Fig. 1, the downward movement of the bar 53 is limited by means of stop members 75 which are adjustably connected to the frame of the machine, and by rods 75*a* which are suitably connected to said bar 53. These adjustable stops 75 act to regulate the drilling position of the needles S.

As shown in Fig. 4, said adjustable stops 75 are clamped in position by means of set-screws 110 and compressible blocks 111 which are made of leather or other suitable material.

The bridge 22 slides horizontally between threaded guide members 77 which pass through the frame of the machine, and which are held in position by means of nuts 78. These members 77 can be adjusted in order to control the lateral position of the bridge 22, during its horizontal sliding movement.

As shown in Fig. 4, the rock-shaft 74 is provided with a nose 80 which acts as a cam. This nose 80 is split, so that it can be forced over the rock-shaft 74, and the ends of the nose 80 are tightened by means of the screw 81, so that the members 74 and 80 rock in unison.

As shown in Fig. 7, the rollers 21 and 21*a* act to intermittently depress the nose 80, so that the rock-shaft 74 is intermittently rocked. Hence, the rod 71 which is shown in Fig. 4, is raised twice for each complete revolution of the main drive shaft 1.

The rock-shaft 74 also has connected thereto a rod 73*a* having a pin 72*a* which operates a rod 71*a*. Said rod 71*a* corresponds to the rod 71, so that said rod 71*a* operates the plunger 66*a*, in unison with the plunger 66.

The rods or levers 73 and 73*a* are provided with extensions 82 and 82*a*, to which a bar 83 is adjustably connected by means of set-screws 83*a*.

However, the weight of the bar 53 and of the parts connected thereto, is sufficient to enable said bar 53 to descend, when this is permitted by the control mechanism, so that the bar 83 merely serves as a counterweight.

As shown in Fig. 3, the belts 41 are loose and do not operate the grinding members, except when the bridge 22 is pushed to its extreme right-hand or outer position. In this position the belts 41 are tightened so that they operate the grinding members, in order to grind the needles.

Fig. 9 illustrates the grinding position of the needles S.

Fig. 7 illustrates the positions of the parts just before commencing the grinding operation upon the spindles S.

The bridge 22 is moved back into the position shown in Figs. 2 and 3, by means of tension springs 90 whose rear ends are connected to a rod 91, suitably connected to the frame F. The front ends of the springs 90 are connected to pins 92 which are connected to the underside of the bridge 22, as shown in Fig. 5.

Guides 93 are provided in order to prevent the belts 41 from slipping off the grinding members 39.

The wires 56*a* and 56*b* of each coil 56, are suitably insulated from each other, and they are wound to form cables 95 which pass through a sleeve or hollow fibre rod 96 mounted upon supports 97 and 97*a*. This fibre sleeve 96 is held within collars 100 and 100*a* which are mounted at the upper ends of said supports, and the fibre sleeve 96 is held in position by means of set-screws 102 and 102*a*.

As shown in Fig. 6, the coils 56 are connected in parallel across the power mains M and M*a* which are connected to a suitable source of alternating current, either directly, or by means of a suitable transformer. Hence, alternating current of ordinary commercial frequency is delivered to the coils 56. I prefer to use a current having a frequency of thirty times per second, so that the magnets are energized and deenergized three thousand six hundred (3,600) times per minute. This causes the needles S to reciprocate at the rate of three thousand six hundred (3,600) times per minute, in addition to the up and down movement produced by the bar 53.

A main rheostat R is provided in the power main, and each of the coils 56 is provided with an individual adjustable rheostat 56*r*.

The frame F is provided with stops 103 and 103*a*, which limit the movement of the bridge 22.

The needles S are continuously revolved by the belts 50.

As shown for example in Fig. 9, the members 30 hold the needles S against the grinding members 39 when said needles S are in the grinding position. Any approved practice in this respect can be followed. That is, it is not necessary to jam the points of the needles S against the grinding members 39, as it is ordinarily sufficient to prevent the points of said needles from vibrating away from the members 39. The contacting

peripheries of needles S and of the members 39 are preferably revolved in opposite directions, in order to secure the proper grinding action. When the needles S are in the grinding position, the circuit of the electro-magnets can be broken by any suitable circuit-breaker, such as a circuit-breaker operated by a cam on the main shaft, or any other shaft, in order to prevent the rapid reciprocation of the needles S while they are being ground.

The operation of my machine is as follows:—

The die-blanks D which are placed within the members 30, are of any suitable type. They consist ordinarily of unperforated disks of metal, each said disk having a small conical depression aligned with the vertical central axis thereof, this depression being used for forming the bore. This depression is filled with a mixture of abrasive dust, such as diamond dust, or the like, and a little oil. This is well known practice and any suitable method may be employed in this connection.

The members 75 are adjusted, so that further downward movement of the bar 53 is prevented, after the bores have been completely formed, or in any desired intermediate position.

The positions of the members 30 and 39 are then adjusted, so that when the bar 53 is in its lower position, the needles S can enter the tapered recesses before mentioned, in order to start the operation of forming the bore. As the needles S gradually form the bore, the heads 27 and 37 are turned, so as to raise the blanks D, and to also raise the grinding members 39. The bore of each die is therefore gradually formed as each of the needles continues its grinding action. I do not wish to limit myself to any particular relative vertical position between the members 30 and 39. For example, the member 39 can be kept at a fixed height if desired. Likewise, if desired, the positions of the needles S, in the lower position of the bar 53, can be regulated by means of the stop members 75. Since the die-blanks D may be of varying hardness, and since it is impossible to produce needles S which are absolutely uniform, the operator can manipulate the heads 27 and 37 so as to make allowance for any variation in conditions, since one or more die-blanks D will often be shaped more rapidly than the others.

The members 47 are reciprocated during each half-period of the alternating current, this reciprocation being rapid. That is, when the flux produced by the alternating current becomes sufficiently high, the core 57 attracts and rapidly raises the member 47. When the flux produced by the alternating current is insufficient to retain the member 47 in position, said member 47 drops, together with the needle S.

The vertical reciprocation of the needles S which is thus produced by the electro-magnetic devices, is of course much more rapid than the vertical reciprocation of the bar 53. The vertical movement of the bar 53 is utilized to sharpen the needles S, after a predetermined number of reciprocations produced by the electro-magnetic devices. Since the needles S have smooth peripheries, they could not form the bore by merely turning. However, the rapid vertical reciprocating movement of the needles, together with the turning thereof, forms and shapes the bore in a satisfactory and reliable manner.

It would be obviously undesirable to have the needles S rapidly reciprocated during the grinding operation, and the current to the coils 56 is therefore interrupted, during the grinding operation.

While I prefer to use electro-magnetic means for rapidly reciprocating the needles S, I do not wish to be limited thereto, as the invention is broadly new in many aspects.

Likewise, while I have mentioned that the machine is to be used for forming the bores of wire-drawing dies, I do not wish to be limited to this specific use, as my invention is generally applicable to any type of boring or drilling machine.

Likewise, while I have illustrated the needles S as being moved upwardly in order to remove them from contact with the blanks D and the bridge 22 being moved in a horizontal plane, I do not wish to be limited to the movements in these directions, as the essential idea is to remove the needles from contact with the blanks, in order to subject them to a grinding operation. I prefer to lower the needles, while they are out of contact with the blanks, in order to subject the needles to a grinding operation, but I do not wish to be limited to this detail, as this part of my invention, as well as other parts thereof, are broadly new. Likewise, the term "needle" is intended to include any grinding device.

In order to conveniently designate the parts in the claims, the member 53 may be designated as the needle-support, the member 47 may be designated as the needle-plunger, and the member 45 may be designated as the needle-holder.

I have shown a preferred embodiment of my invention, but it is clear that numerous changes and omissions can be made without departing from its spirit.

I claim:

1. In a machine for forming a bore in a wire-drawing die or the like, a holder for a blank, a needle, means adapted to revolve said needle, means adapted to raise and to lower said needle so that the needle is moved out of contact with the blank when the needle is in its upper position, additional means adapted to rapidly reciprocate the needle and means adapted to grind the needle when it is out of contact with the blank and while said additional means are inoperative.

2. In a machine for forming a bore in a wire-drawing die or the like, a movable mount, said mount having a holder for a blank located thereon, said mount also having a needle grinding device mounted thereon, a needle, means adapted to revolve said needle, means adapted to raise and to lower said needle so that the needle is moved out of contact with the blank when the needle is in its upper position, and automatic means adapted to control the up and down movement of the needle and the movement of the mount, so that the needle is lowered to contact with the grinding device when the mount is shifted in order to locate said grinding device below said needle.

3. In a machine for forming a bore in a wire-drawing die or the like, a mount adapted to reciprocate in a horizontal plane, said mount having a holder for a blank located thereon, said mount also having a grinding device located thereon, a needle, means adapted to revolve said needle, and means adapted to raise and lower said needle so that the needle is moved out of contact with the blank when the needle is in its upper position, and automatic means adapted to shift the mount at predetermined intervals so that the grinding device is shifted to a position under said needle so as to contact therewith when the needle is lowered.

4. In a machine for forming a bore in a wire-drawing die or the like, a mount adapted to reciprocate in a horizontal plane, said mount having a holder for a blank located thereon, said mount also having a grinding device located thereon, a needle, means adapted to revolve said needle, and means adapted to raise and lower said needle so that the needle is moved out of contact with the blank when the needle is in its upper position, and automatic means adapted to shift the mount at predetermined intervals so that the grinding device is shifted to a position under said needle so as to contact therewith, and actuating means for said grinding device, said actuating means being inoperative when said mount is moved to a position in which the periphery of said grinding device is out of alignment with said needle.

5. In a machine for forming a bore in a wire-drawing die or the like, a mount adapted to reciprocate in a horizontal direction, said mount having a holder for a blank located thereon, said mount also having a revoluble grinding device located thereon, a vertically movable needle-support located above said mount, a revoluble needle-holder mounted in said needle-support and adapted to hold a needle, a driven shaft, a first belt connecting said shaft and said needle-holder, said first belt being maintained substantially taut during the up and down movement of the needle-support, a second belt connecting said driven shaft and said grinding device, said second belt being maintained taut when the grinding device is located underneath the needle, and said second belt being maintained slack and inoperative when the grinding device is shifted away from a position underneath the needle, and automatic means adapted to cause the vertical reciprocating movement of said needle-support and the horizontal reciprocating movement of said mount, so that the grinding device is shifted to a position underneath the needle and the needle is lowered to contact with said grinding device at predetermined intervals.

6. In a machine for forming a bore in a wire-drawing die or the like, a mount adapted to reciprocate in a horizontal direction, said mount having a holder for a blank located thereon, said mount also having a revoluble grinding device located thereon, a vertically movable needle-support located above said mount, a revoluble needle-holder mounted in said needle-support and adapted to hold a needle, a driven shaft, a first belt connecting said shaft and said needle-holder, said first belt being maintained substantially taut during the up and down movement of the needle-support, a second belt connecting said driven shaft and said grinding device, said second belt being maintained taut when the grinding device is located underneath the needle, and said second belt being maintained slack and inoperative when the grinding device is shifted away from a position underneath the needle, and automatic means adapted to cause the vertical reciprocating movement of said needle-support and the horizontal reciprocating movement of said mount, so that the grinding device is shifted to a position underneath the needle and the needle is lowered to contact with said grinding device at predetermined intervals, the periphery of said holder being shaped to hold the needle in contact with the grinding device, during said predetermined intervals.

7. In a machine for forming a bore in a wire-drawing die or the like, a mount adapted to reciprocate in a horizontal direction, said mount having a holder for a blank located thereon, said mount also having a revoluble grinding device located thereon, a vertically movable needle-support located above said mount, a revoluble needle-holder mounted in said needle-support and adapted to hold a needle, a driven shaft, a first belt connecting said shaft and said needle-holder, said first belt being maintained substantially taut during the up and down movement of the needle-support, a second belt connecting said driven shaft and said grinding device, said second belt being maintained taut when the grinding device is located underneath the needle, and said second belt being maintained slack and inoperative when the grinding device is shifted away from a position underneath the needle, and automatic means adapted to cause the vertical reciprocating movement of said needle-support and the horizontal reciprocating movement of said mount, so that the grinding device is shifted to a position underneath the needle and the needle is lowered to contact with said grinding device at predetermined intervals, said holder and said grinding device being vertically adjustable with respect to said mount.

8. In a machine for forming a bore in a wire-drawing die or the like, a holder for a blank, a vertically movable needle-support, a needle-plunger held on said support and vertically movable with respect thereto, means adapted to revolve the needle-plunger, means adapted to vertically move said needle-support so that the needle is moved out of contact with the blank when the needle-support is in its upper position, means adapted to grind the needle when it is out of contact with the blank, and means adapted to impart a rapid reciprocating movement to said needle-plunger only when it is out of contact with said grinding means.

9. In a machine for forming a bore in a wire-drawing die or the like, a holder for a blank, a needle-support, a needle-plunger held on said support and vertically movable with respect thereto, means adapted to revolve the needle-plunger, means adapted to vertically move said needle-support so that the needle is moved out of contact with the blank when the needle-support is in its upper position, means adapted to grind the needle when it is out of contact with the blank, and means adapted to vertically reciprocate the plunger comprising an electro-magnet having means adapted to rapidly energize and deenergize the same.

10. In a machine for forming a bore in a wire-drawing die or the like, a holder for a blank, a needle-support, a needle-plunger held on said support and vertically movable with respect thereto, means adapted to revolve the needle-plunger, means adapted to vertically move said needle-support so that the needle is moved out of contact with the blank when the needle-support is in its upper position, means adapted to grind the needle when it is out of contact with the blank, and an electro-magnet whose coil is connected to a source of alternating current so that said electro-magnet is alternately energized and deenergized, said electro-magnet being adapted to vertically move said needle-plunger.

11. In a machine for forming a bore in a wire-drawing die or the like, the sub-combination of a needle-plunger adapted to hold a needle, means adapted to revolve said needle-plunger while permitting the free vertical movement thereof, and

means adapted to rapidly reciprocate said needle-plunger, said means comprising an electro-magnet which is alternately energized and de-energized.

12. In a machine for forming a bore in a wire-drawing die or the like, the sub-combination of a needle-plunger adapted to hold a needle, means adapted to revolve said needle-plunger while permitting the free vertical movement thereof, and means adapted to rapidly reciprocate said needle plunger, said means comprising an electro-magnet whose coil is connected to a source of alternating current, so that said electro-magnet is alternately energized and deenergized.

13. In a machine for forming a bore in a wire-drawing die or the like, a mount, means adapted to reciprocate said mount in a horizontal direction, a vertical movable needle-support located above said mount, and having a needle connected thereto, means adapted to vertically move said support so that the needle is moved out of contact with the blank, and to then permit said support to descend, said mount being shifted during alternate downward movements of said needle-support, a grinding device located on said mount and adapted to contact with said needle, means adapted to revolve said grinding device, said grinding device and said support being vertically adjustable with respect to said mount.

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