

No. 733,072.

PATENTED JULY 7, 1903.

D. J. McMAHON.
WIRE DRAWING MACHINE.
APPLICATION FILED NOV. 27, 1901.

NO MODEL.

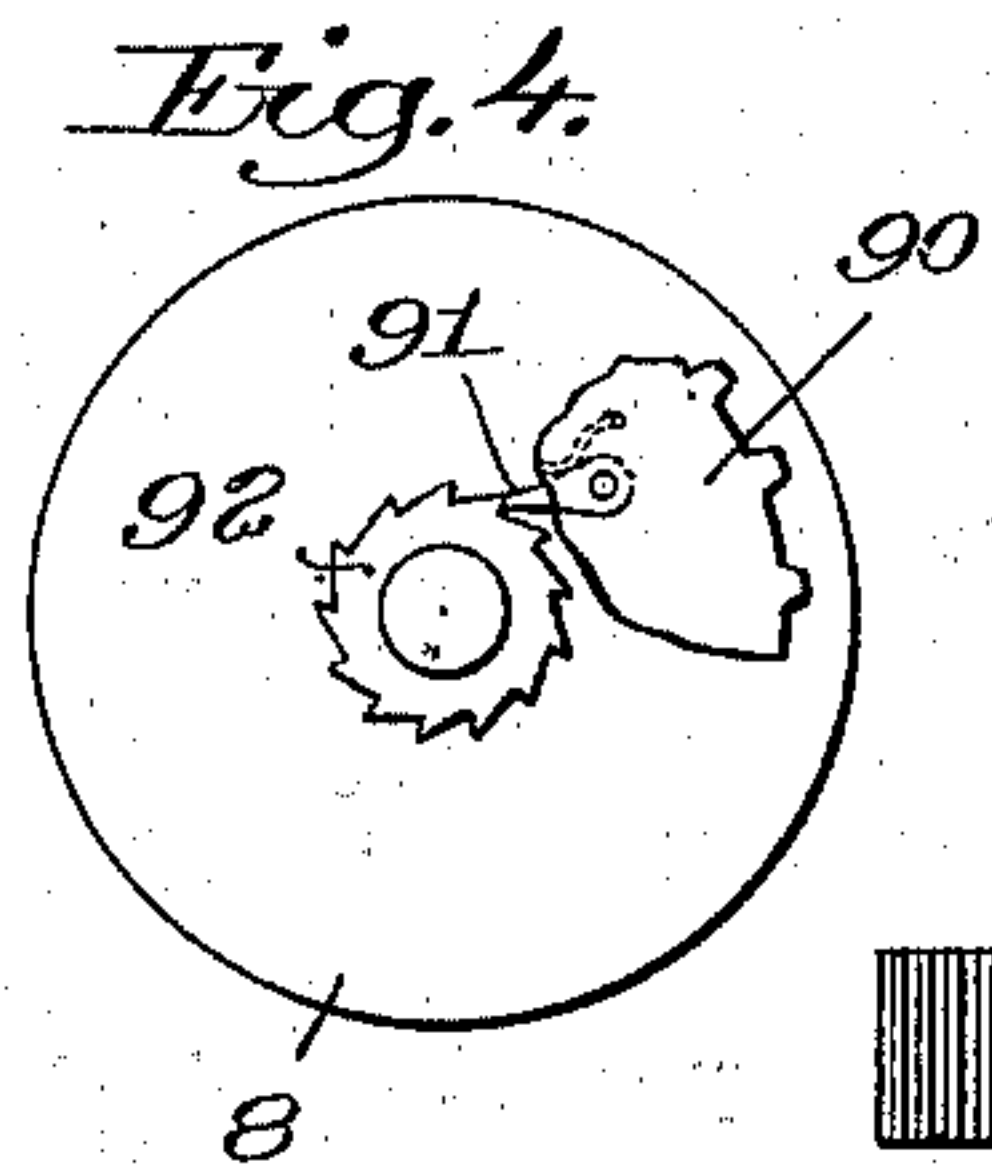
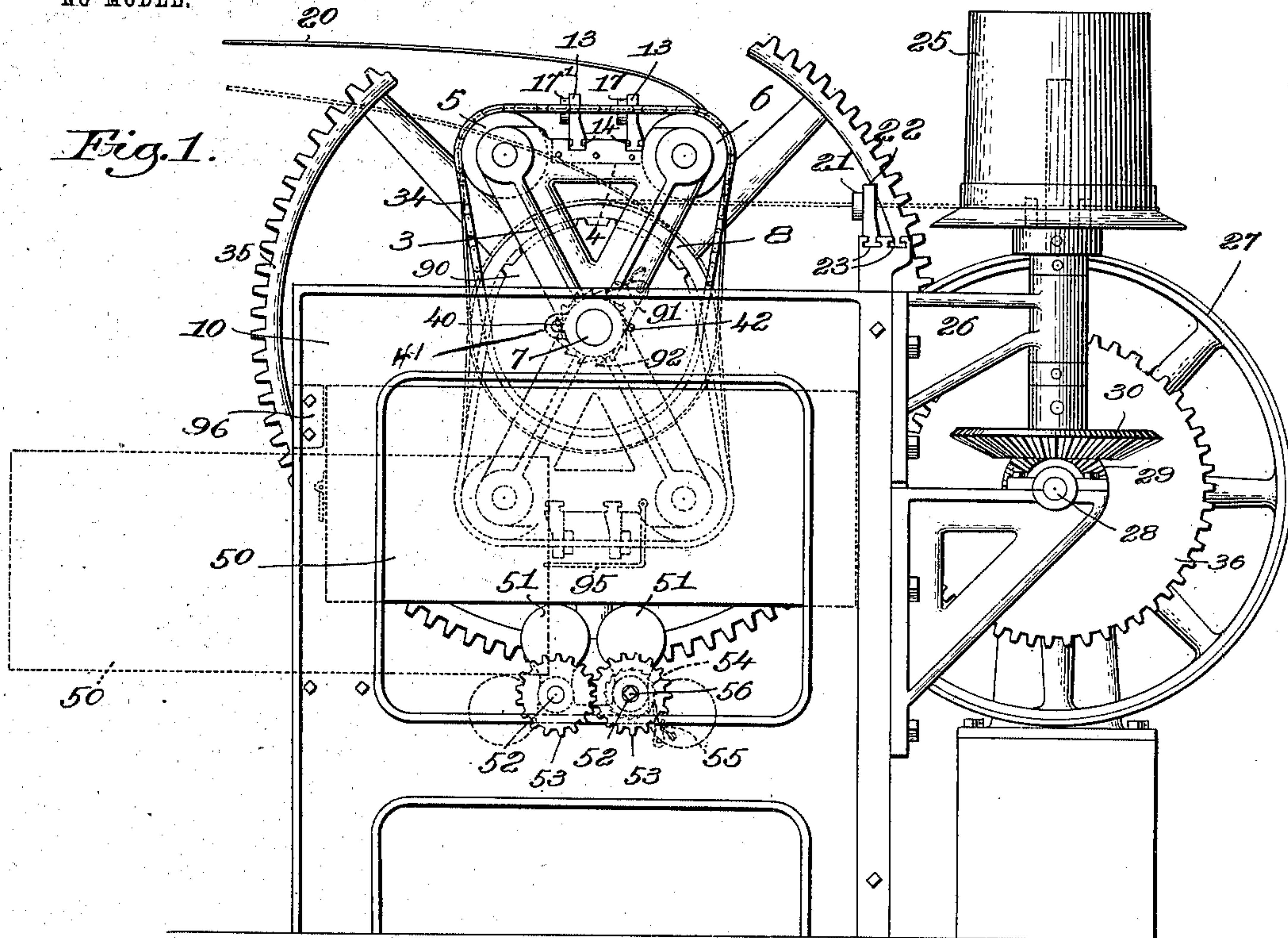
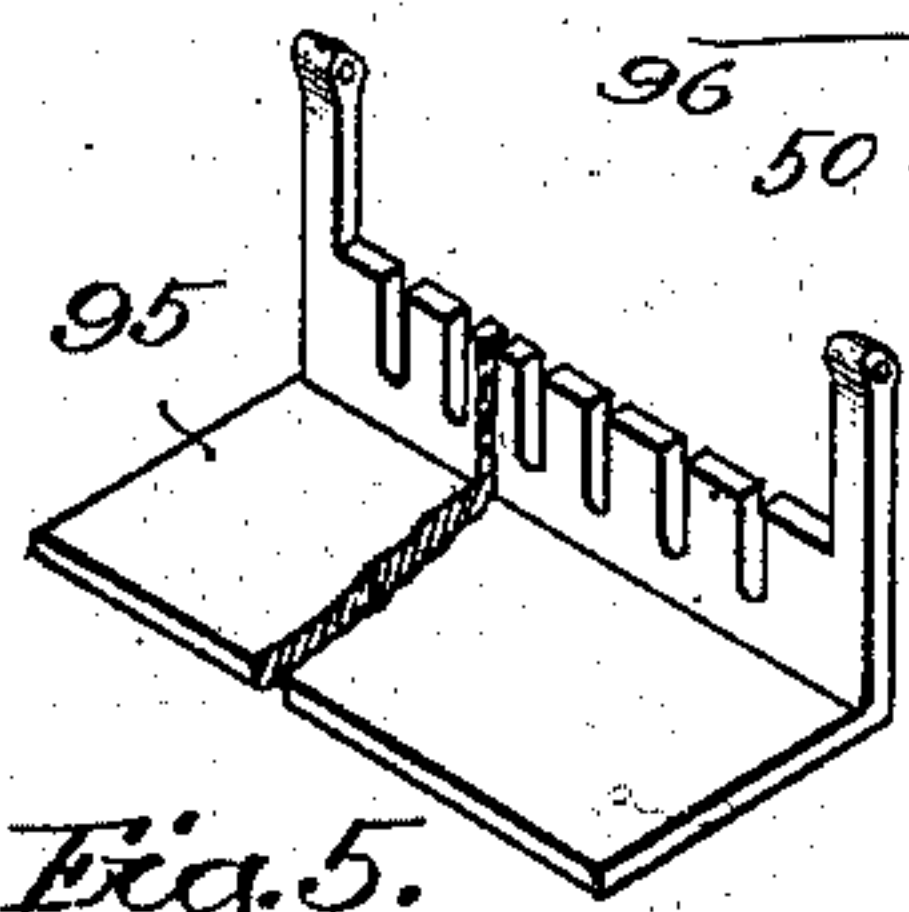
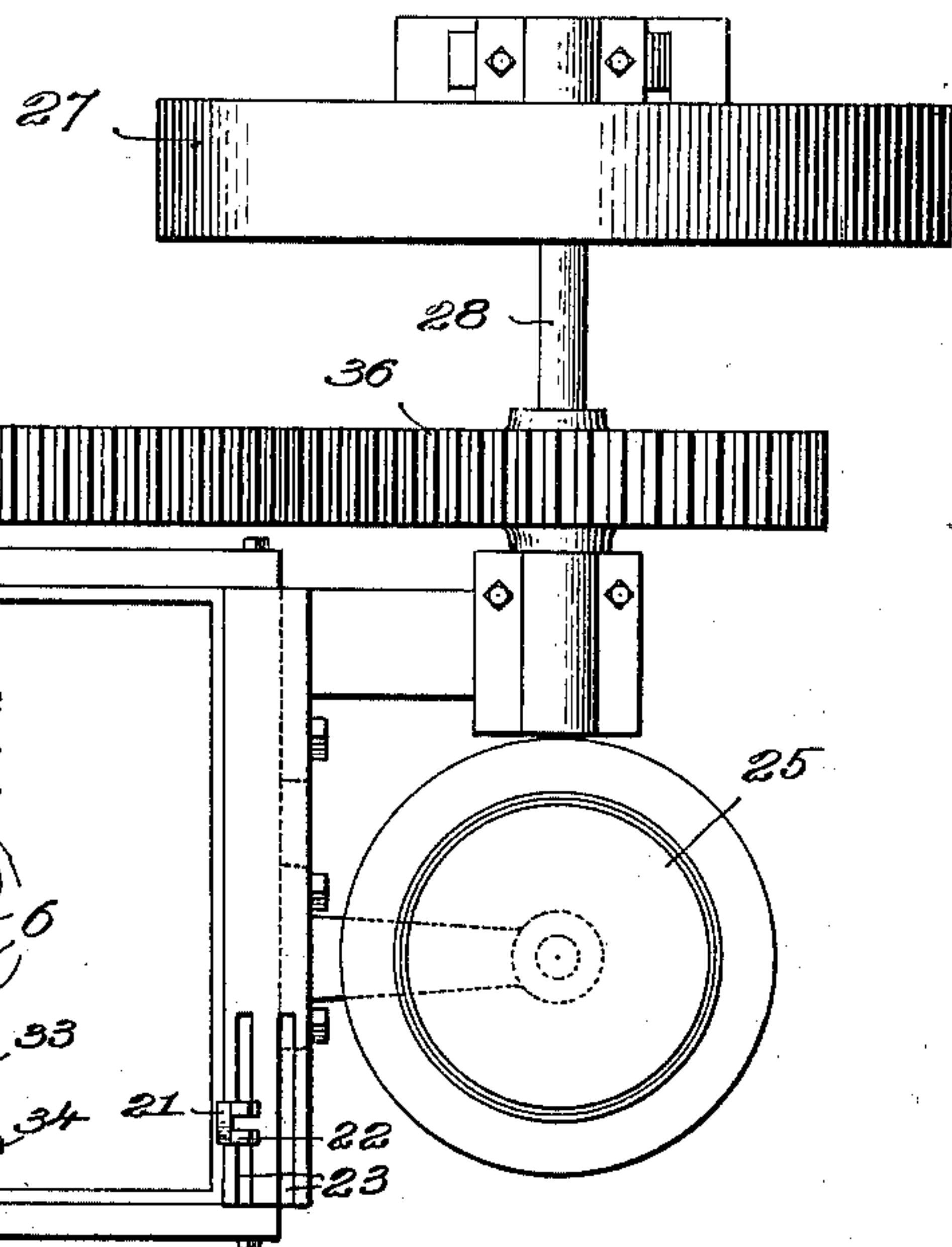
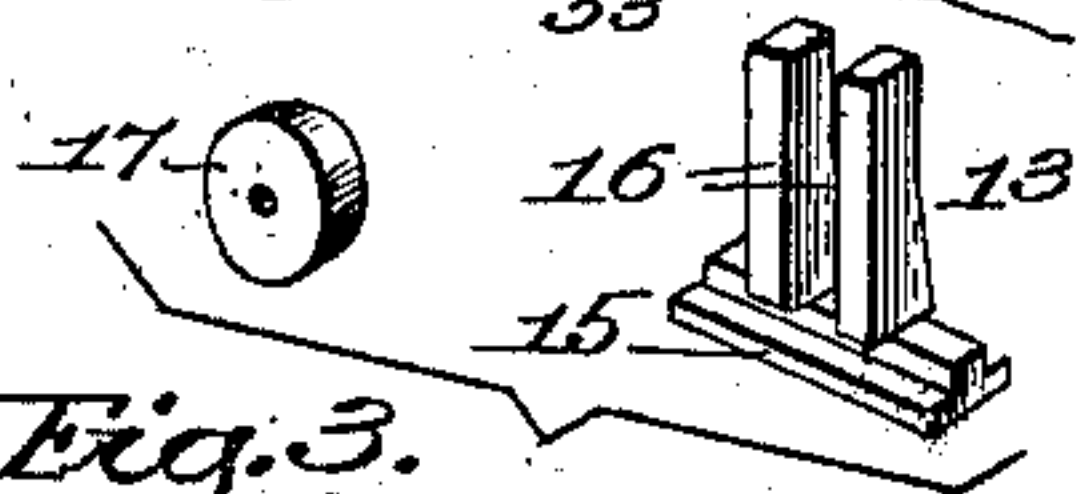


Fig. 2.



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UNITED STATES PATENT OFFICE.

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WIRE-DRAWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 733,072, dated July 7, 1903.

Application filed November 27, 1901. Serial No. 83,840. (No model.)

To all whom it may concern:

Be it known that I, DANIEL J. MCMAHON, a citizen of the United States, residing at Taunton, in the county of Bristol and State of Massachusetts, have invented an Improvement in Wire-Drawing Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to machines for drawing wire; and it has for its object to improve the class of wire-drawing machines known to the trade as "continuous" wire-drawing machines. These continuous wire-drawing machines as commonly constructed comprise a suitable frame supporting a drawing-roll and a plurality of "idlers," so called, both the drawing-rolls and idlers being mounted in the frame with their axes preferably parallel. Situated between the drawing drum or roll and the idlers is a series of drawing-dies, and in operation the wire to be drawn is coiled around the drawing drum and rolls, each turn of the coil being passed through one of the dies of the series. As the wire is drawn from the machine it is received upon a suitable block, as usual. The drawing-drum and the block are positively rotated, thereby giving motion to the wire coiled about the drawing drum and rolls and drawing the wire through the dies.

The object of my invention is to improve this class of continuous wire-drawing machines by simplifying the construction and thereby reducing the cost of manufacture.

My invention comprises a suitable frame in which is mounted the usual drawing-drum, and upon the shaft of the drawing-drum is pivotally mounted a frame supporting a plurality of drawing-dies. Beneath the drawing-drum is a detachable tank or vat adjustably supported. The construction is such that when it is desired to "string up" the machine the frame carrying the drawing-dies is supported in a position above the drawing-drum and within convenient reach of the operator. The wire is then passed around the drawing-drum and frame in one or more coils, each turn of the coil as it is passed around the drum and frame being threaded through one of the dies, and thereafter the end of the wire is secured

to the usual block in the usual way. The frame containing the dies is then turned about the shaft of the drawing-drum, so as to be in a position beneath the same, and thereafter the detachable tank or vat which contains the usual cooling or lubricating liquid is adjusted vertically, so as to bring the dies into the liquid in the vat or tank. This construction, therefore, while affording a convenient way of "stringing up" the machine, at the same time does away with the necessity of using a pump for delivering the cooling or lubricating liquid to the dies, as is required in the common construction of machine, for the construction of my machine is such that when in operation the dies are immersed in the tank. Furthermore, by making the tank separate and detachable from the frame the same may be readily removed and the old or waste liquid therein emptied and new liquid placed therein.

In the common construction of machine when the tank is fixed to the frame the only way of emptying the tank is by bailing the same, which is a tedious and unsatisfactory operation.

My invention also comprises a novel means for stringing up the machine and other features, which will be more fully hereinafter described, and pointed out in the claims.

Figure 1 shows in end elevation my improved wire-drawing machine, the full-line position of the frame being that occupied by the said frame when the wire is being coiled thereabout and threaded through the dies, this operation being commonly known as "stringing up," and the dotted-line position being that of the frame while the wire is being drawn. Fig. 2 is a top plan view of Fig. 1. Fig. 3 is a perspective of one of the dies and its die-post, and Figs. 4 and 5 are details hereinafter described.

10 designates any suitable supporting structure which is adapted to support the operative parts of the machine. Journaled in said supporting structure is a shaft 7, having mounted thereon a suitable drawing roll or drum 8, and pivotally mounted upon said shaft is a frame adapted to support the usual drawing-dies 17. This frame, which I will term the "drawing-frame" for convenience, may be of any suitable construction, though I have found that the construction shown in the drawings is well

adapted to accomplish the result desired. The said drawing-frame is illustrated as comprising the two side members 3, which are connected by a bridge-piece 4, the said side members 3 being journaled on the shaft 7, as shown, whereby the frame can be swung bodily about the shaft 7 from the full-line to the dotted position, Fig. 1, or vice versa. The bridge 4 of the frame is adapted to support a series of dies, there being two series of dies in this embodiment of my invention. As illustrated, said bridge-piece 4 is provided with the dovetailed grooves 12, in which the die-posts 13 are slidably mounted, the said grooves preferably being provided either with the open end for the insertion of the die-posts or with the enlarged opening 14, through which the base of the die-posts may be inserted into the groove. The die posts or holders 13 comprise the base portion 15 of a shape to fit the dovetailed groove 12 and the upright fingers 16, projecting upwardly from the base 15, the said fingers adapted to have the die 17, of any suitable shape and size, rest against the same, as illustrated in Figs. 1 and 2.

In operation the wire which passes through the aperture in the die will pass between the fingers 16, and the force necessary to draw the wire through the die will be sufficient to maintain the die in position against the fingers, this construction permitting of any necessary play in the dies.

I will preferably journal on the drawing-frame two series of rolls or idlers, about which the turns of the coil of wire pass, the idlers of one series being designated by 5 and those of the other series being designated by 6. These idlers may all be loose on the shaft or rod which supports them, so as to each have a turning movement independent from the others, and, as shown, one series—that marked 5—is on one side of the dies and the other series—that marked 6—is on the other side thereof, so that each turn of the coil of wire passes through a die in passing from an idler of one series to an idler of the other series. The dies when in operation are so situated as to be in a common tangential line to the rolls or idlers of the two series, as will be obvious.

In order to set the machine in operation, the wire 20, which is to be drawn, is passed about the drawing-drum and the frame in coils and threaded through the various dies 17, as illustrated in Fig. 2, this operation being commonly known as "stringing up" the machine. To accomplish this, the wire is passed, as shown in Fig. 1, over idlers 5 and 6 and under the drawing-drum 8, then over one of the idlers 5, the end of the wire, which has previously been pointed, being threaded through a die 17', which is supported in one of the grooves 12. The free end of the wire is then seized by a suitable grip device, which automatically carries the wire around beneath the drawing-drum 8 and over the rolls or idlers of series 5, thus making one coil or

turn of the wire about the rolls, and thereafter the die 17', through which the wire has been partially drawn, is moved in its groove toward the upper portion of Fig. 2 and the free end of the wire passed or threaded through another die, which may be in the other slot 12, if desired. Thereafter the same operation is repeated, the grip device carrying the free end of the wire around beneath the drawing-drum and over the idlers 5 to form another turn of the coil. The second die is then moved toward the upper portion of Fig. 3, and the free end of the wire is passed through another die, this operation being repeated until the wire is threaded through a sufficient number of the dies to reduce it to the proper size. The free end of the wire is then preferably taken through a die 21, similar in construction to that above described and which is supported against a die-holder 22, slidably mounted in a dovetailed groove 23 on the frame and is then wound around any suitable block 25, carried by a vertical shaft mounted in any suitable bearings 26 on the standard 10, the said shaft being driven in any suitable way from the driving-pulley 27. As illustrated, the said pulley 27 is carried on the main driving-shaft 28, which is journaled in any suitable bearings and has thereon a bevel-gear 29, meshing with the bevel-gear 30 on the lower end of the shaft, which supports the block 25.

The grip device which I preferably employ is shown as a pair of jaws 33, carried by a sprocket-chain 34, which passes around and meshes with sprocket-teeth on the end rolls of the two series 5 and 6 and sprocket-teeth on a sprocket-wheel 90, which is loose on the shaft 7.

The drum 8 is fast on the shaft 7 and is rotated by means of a gear-wheel 35, which meshes with a suitable gear 36 on the shaft 28, and the said drum is connected to the sprocket-wheel 90 by a pawl-and-ratchet connection, the construction being such that the forward rotation of the drawing-drum 8 carries with it the sprocket-wheel, while allowing of the sprocket-wheel being rotated forwardly independently of the drum.

The pawl-and-ratchet connection between the drum 8 and sprocket-wheel, which is illustrated, comprises a ratchet 92, fast with the drum 8, and a spring-pressed pawl 91 on the sprocket-wheel, which coöperates with the ratchet. As shown in Fig. 4, the pawl and ratchet are so disposed that as the drum is rotated forwardly it will carry the sprocket with it, and thereby carry the grip device around the drawing-drum and idlers. The sprocket-wheel, therefore, may be rotated forwardly independently of the drum, so that if the grip device is not in a convenient position to grasp the end of the wire when it is desired to string the machine up the sprocket-wheel may be rotated forwardly by hand independently of the drum 8 to thereby carry the grip device around to the point desired, or the pawl

may be raised from engagement with the ratchet by hand, when the sprocket-wheel may be turned backwardly to bring the grip device into the desired position. It will be obvious that the pawl might be placed on the drum, if desired. When it is desired to set the machine in operation, therefore, the free end of the wire is threaded through the first die 17' and is then seized by the jaws 33, said jaws having first been brought into the proper position, as above described. Upon rotating the driving-shaft 28 the drum 8 will be thereby rotated, thus turning the sprocket-wheel chain and carrying the sprocket-chain and jaws 33 around the frame and drum 8 to make one turn of the coil of wire. The free end of the wire is then threaded through the second die, and the operation is repeated, as above described. While the wire is being coiled around the frame and drum 8 and threaded through the dies the frame will be in the full-line position, Fig. 1, and will be held therein by means of a pin 40, which passes through an aperture in an ear 41 on the frame and locks into a suitable hole in the standard 10. After the wire has been thus coiled around the frame and drawing-drum the pin 40 may be withdrawn and the frame turned about the shaft 7 into the dotted-line position, when the pin will be inserted into the hole 42 to lock the frame in this position. When the frame is in the dotted-line position, the dies therein are brought into a suitable cooling and lubricating liquid in a vertically-adjustable vat 50, whereby the drawing operation of the wire takes place in said liquid, and the dies are kept cool.

After the machine has been strung up as above described and the frame swung into the dotted-line position the drawing operation takes place as usual in machines of this class. It will be noted, however, that the wire passes around the drawing-drum 8 with more or less of a spiral trend and that therefore as the drum 8 is positively rotated in unison with the block the friction between the drum and wire is increased on account of the spiral trend of each turn of the coil of wire when it has contact with the said drawing-drum, and hence the effectiveness of the device is correspondingly increased.

The vat 50 is preferably detachable from the standard or supporting structure, it being shown as supported upon cams 51, carried by suitable shafts 52, which shafts are journaled in any suitable way in the standard 10. The ends of the shafts 52 have thereon intermeshing gears 53, and one of said shafts has a ratchet-wheel 54, with which coöperates a pawl 55, the said shaft also preferably having a squared portion 56, by means of which a crank may be applied thereto.

When it is desired to lower the vat 50, the pawl 55 will be released from the ratchet-wheel and the shaft 52, having the squared portion 56 thereon, will be turned to throw its cam 51 into the dotted-line position, Fig. 1,

the intermeshing gears 53 also operating to throw the cam on the other shaft into the similar position.

In operation the vat will be in its lowered position while the wire is being coiled about the frame and drawing-drum, and after the machine has been "strung up" the frame will be swung into dotted-line position. The vat will then be raised by turning the shafts 52, the pawl 55 serving to maintain the vat in any desired position.

From Fig. 1 it will be seen that when the vat is lowered it may readily be withdrawn, as shown in dotted lines, for the purpose of cleaning the vat or for replacing the used liquor by fresh liquor, &c.

After the vat or tank has been raised into operative position, or that shown by full lines, a cross-bar 96 on the supporting structure serves to hold it in place.

I preferably provide two dovetailed grooves 23 for supporting the die-holders 22, so that the said dies 21 may be placed in one or the other of said grooves, according to the size of the block 25 used.

It will be understood that it is necessary that the die 21 should be in that tangent line to the block 25 which intersects the last die 17 upon the frame, and by slidably mounting said die-holders in a groove this exact position may be secured.

If a smaller block 25 than that shown is employed, I will preferably place the die-holder 22 in the groove 23 nearest the block. By using two grooves 23 the die 21 may always be positioned at the proper distance from the block regardless of the size of the block.

When the frame supporting the dies is in its operative position; or that shown in dotted lines, Fig. 1, the dies are supported entirely by the wire being drawn. It follows that when a length of wire has been drawn through the dies said dies would fall to the bottom of the vat or tank unless some provision were made for catching them as the end of the wire was pulled through them. I therefore preferably detachably secure to the said frame a shelf-like device which when in its operative position is situated beneath the dies and upon which the dies will fall should the wire break or run out. This device is shown in Fig. 5 and comprises an angular structure 95, having arms which are adapted to be detachably secured to the frame, as seen in dotted lines, Fig. 1. It is designed that this device will be secured in place after the machine has been strung up and before the frame is turned from the full to the dotted line position. It will be noted that the frame 3, on which the dies are mounted, can be swung about the axis of the roll in either direction and may, if desired, be swung entirely around the axis. This is of especial advantage, because in drawing of wire of different sizes it is desirable to obtain a greater or less drawing-surface upon the drawing-roll, accordingly as the wire is

larger or smaller. This greater or less drawing-surface between the wire and the drawing-roll may be obtained by my device by swinging the frame 3 either to the right or left of the dotted-line position, (shown in Fig. 1,) for it will be observed that if the frame is swung to the right the wire in passing from the dies to the block 25 will contact with more of the surface of the drawing-drum than if the frame were swung to the left. Therefore when wire of smaller size is being operated upon the frame will be fixed in a position more or less to the left of the position shown in dotted lines, Fig. 1, while when the larger sizes of wire are being drawn the frame will be swung to the right.

It will be seen from the above description that my wire-drawing machine is very compact in its structure and has many advantages over the common form of continuous wire-drawing machines, some of these advantages being the ease of "stringing up" the machine, the provisions for readily cleaning or emptying and filling the tank or vat, the fact that no pump is required to supply the dies with the lubricating liquid, &c.

It will be obvious that many changes may be made in the structure of the parts without in any way affecting the operation of the devices, as the invention is not limited to the precise construction shown, but may be varied in various ways within the scope of the appended claims.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a wire-drawing machine, a drawing-drum, a die-carrying frame mounted to be swung about the axis of the drum as a center and into any predetermined angular position either side of the vertical diameter of the drum, and a plurality of dies carried by said frame, the construction being such that by placing the frame in any desired position in its path of movement the effective drawing-surface on the drum may be regulated.

2. In a wire-drawing machine, a drawing-drum, a plurality of dies through which the wire is drawn, and means to vary the effective drawing-surface on the drum, said means comprising devices whereby the dies may be moved in a circle having the axis of the drum as a center, and placed in any predetermined angular position either side of the vertical diameter of the drum.

3. In a wire-drawing machine, a drawing-drum, a die-carrying frame mounted to swing about the axis of the drum as a center, and capable of movement into any desired angular position, two series of idlers supported by said frame, a series of dies supported between the idlers, and a lubricant-containing vat beneath the drum, the swinging movement of the frame carrying the dies into the vat and furnishing means to vary the amount of drawing-surface on the drum according to the size of the wire being drawn.

4. In a wire-drawing machine, a drawing-drum, a die-carrying frame mounted to have a movement concentric to the axis of the drum, and capable of being swung completely around the drum, said die-carrying frame having a dovetailed groove, and a series of individual die-holders slidably mounted in said groove, said die-holders each comprising a base portion having fingers projecting therefrom against which the dies rest, said base portion being shaped to fit the groove, combined with means to rotate said drawing-drum.

5. In a wire-drawing machine, a drawing-drum, means to rotate the same, and a frame having two series of idlers, and means to support a series of dies between said series of idlers.

6. In a wire-drawing machine, a drawing-drum, means to rotate the same, and a frame mounted to have a movement concentric with the axis of the drum, said frame carrying two series of idlers, and having a plurality of dies supported thereon between the said idlers.

7. In a wire-drawing machine, a drawing-drum, a die-carrying frame mounted to swing concentrically of said drum and completely thereabout, a removable lubricant-containing vat beneath the drum, and means to adjust the vat vertically.

8. In a wire-drawing machine, a drawing-drum, a die-carrying frame mounted to swing about the axis of the drum as its center, and capable of being brought into any angular position, a lubricant-containing vat beneath the drum, and means to raise or lower said vat, said means comprising a plurality of shafts geared together, and cams upon the shafts and on which the vat rests.

9. In a wire-drawing machine, a drawing-drum, a plurality of dies, a removable lubricant-containing vat, beneath the drum, and means to raise or lower the vat as desired, said means comprising a plurality of shafts geared together, and each carrying a cam on which the vat rests.

10. In a wire-drawing machine, a drawing-drum, a die-carrying frame having a plurality of dies mounted thereon, a grip device, and means to move said grip device about the frame and drum, whereby the end of the wire to be drawn may be threaded through one die and then carried by said grip device completely around the drum and frame, and then threaded through the next succeeding die.

11. In a wire-drawing machine, a drawing-drum, a die-carrying frame having a plurality of dies mounted thereon, a sprocket-chain passing around the drum and frame, and capable of having a movement independent of the drum, a grip device carried by the chain, means to connect the chain to the drum, whereby the forward rotation of the drum will carry the chain forward, the construction being such that the end of the wire may be threaded through one die and then carried by said grip device completely around

the drum and frame, and into position to be threaded through the next succeeding die.

12. In a wire-drawing machine, a drawing-drum, a die-carrying frame having a plurality of dies mounted thereon, a sprocket-wheel loose on the shaft of the drum, a sprocket-chain passing about the said wheel and frame, a grip device carried by said sprocket-chain, and automatic means to lock the said sprocket-wheel to the drum when the latter is forwardly rotated.

13. In a wire-drawing machine, a drawing-drum, a die-carrying frame having a plurality of dies mounted thereon, a sprocket-wheel loose on the shaft of the drum, a sprocket-chain passing about the said wheel and frame, a grip device carried by said sprocket-chain, and pawl-and-ratchet mechanism acting to lock the sprocket-wheel to the drum when the latter is forwardly rotated, but allowing the said sprocket-wheel to have a movement independent of the drum to bring the grip device into desired position.

14. In a wire-drawing machine, a drawing-drum, a frame carrying a plurality of dies, means to rotate the drum, a grip device, and connections between the grip device and drum, whereby when the drum is forwardly rotated the grip device is carried about the drum and frame, said connections being of such a character that the grip device may be moved in its path independent of the movement of the drum.

15. In a wire-drawing machine, a standard, a drawing-drum supported thereby, a die-carrying frame pivotally mounted on the shaft of the drum, a block, said standard having a plurality of grooves therein between the block and drum, and a die-holder adapted to be sustained in one of said grooves.

16. In a wire-drawing machine, a die-carrying frame having a dovetail groove therein, a die-holder mounted in said groove, said die-

holder comprising a base portion shaped to fit the groove and provided with fingers against which the die rests, and means to draw the wire through said die.

17. In a wire-drawing machine, a drawing-drum, a frame supported upon the journals of the drum and constructed to swing entirely around the drum in either direction, and a series of dies carried by said frame.

18. In a wire-drawing machine, a standard, a drawing-drum supported therein, a die-supporting frame carried by the journals of the drawing-drum and mounted for swinging movement completely around the drum, a series of dies supported on said frame, and a lubricant-containing vat beneath the drum.

19. In a wire-drawing machine, a drawing-drum, a frame pivoted to swing concentrically of the drum and entirely about the same in either direction, and a series of dies supported on said frame.

20. In a wire-drawing machine, a die-carrying frame having a groove therein, and a series of individual die-holders slidably sustained in said groove and each provided with a base portion to fit the groove, said groove being so shaped as to engage said base portion and prevent the die-holders from being lifted therefrom.

21. In a wire-drawing machine, a die-carrying frame having a dovetail groove therein, and a series of individual die-holders slidably sustained in said groove, each die-holder having a base portion shaped to fit the groove and provided with fingers against which the die rests.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DANIEL J. McMAHON.

Witnesses:

GEORGE A. HOPKINS,
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