L. C. SMITH.

WIRE DRAWING MACHINE.

APPLICATION FILED JULY 6, 1903.

980,569.

Patented Jan. 3, 1911.

3 SHEETS—SHEET 1.

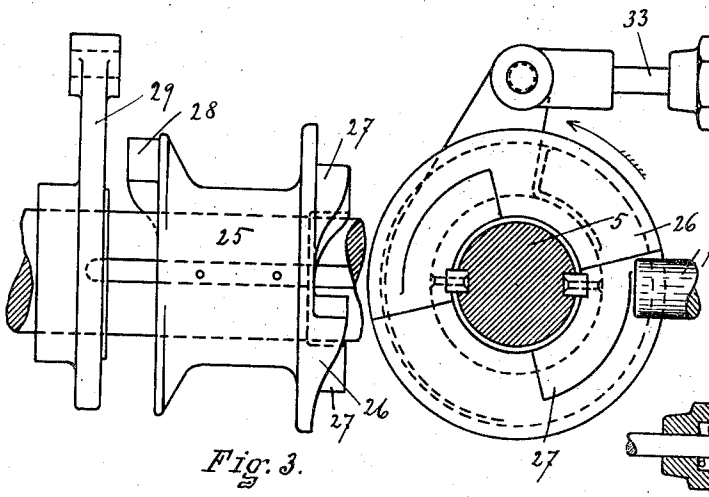

Fig. 3.

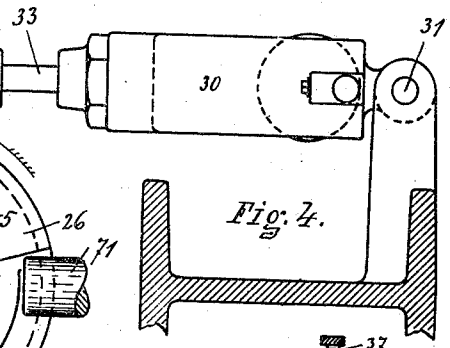

Fig. 4.

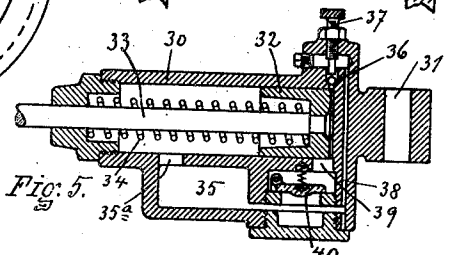

Fig. 5.

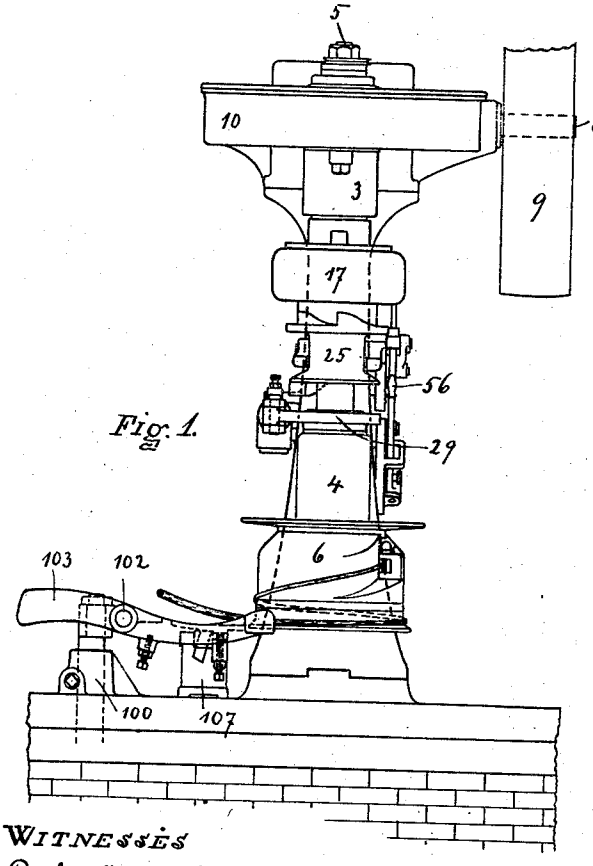

Fig. 1.

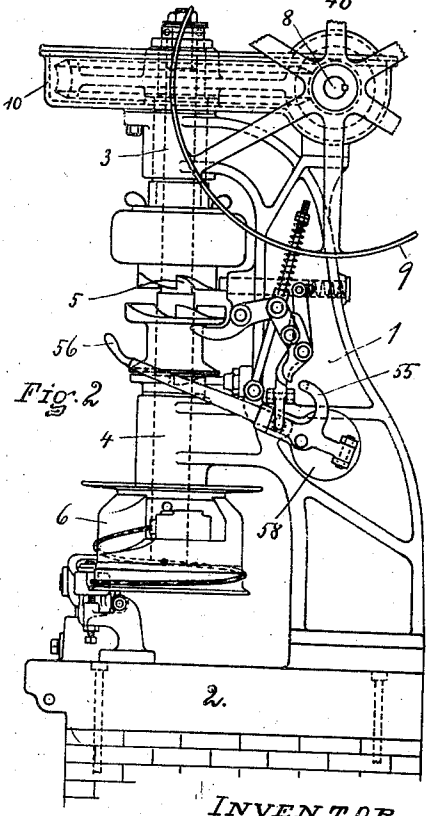

Fig. 2.

WITNESSES

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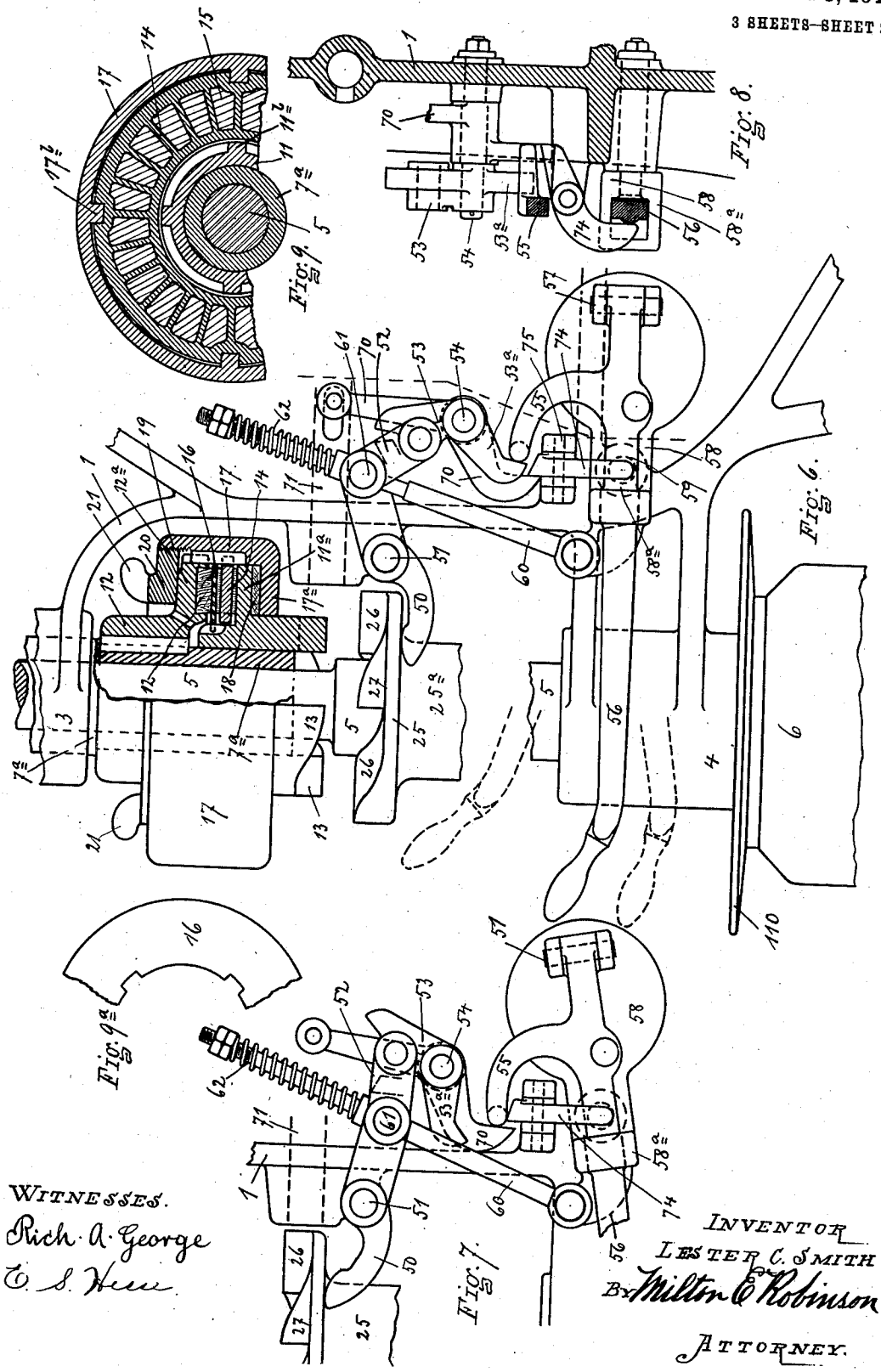

Fig. 9.

Fig. 8.

Fig. 6.

Fig. 9a.

Fig. 7.

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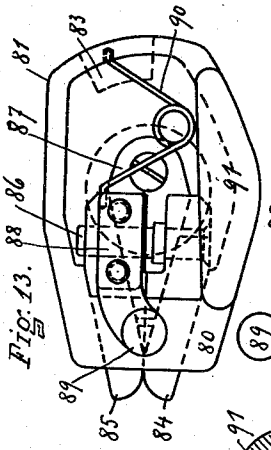

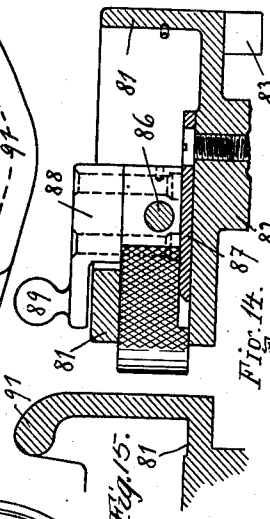

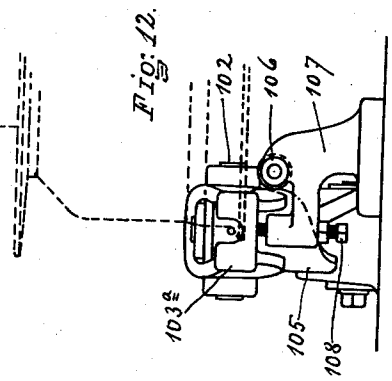

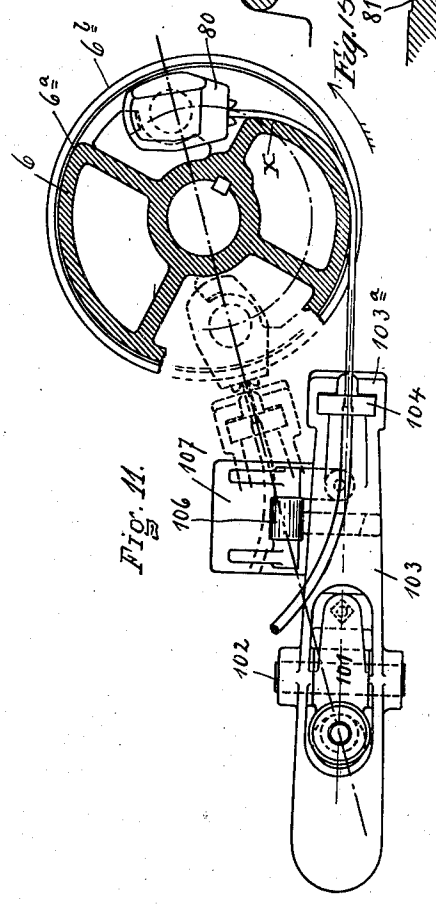

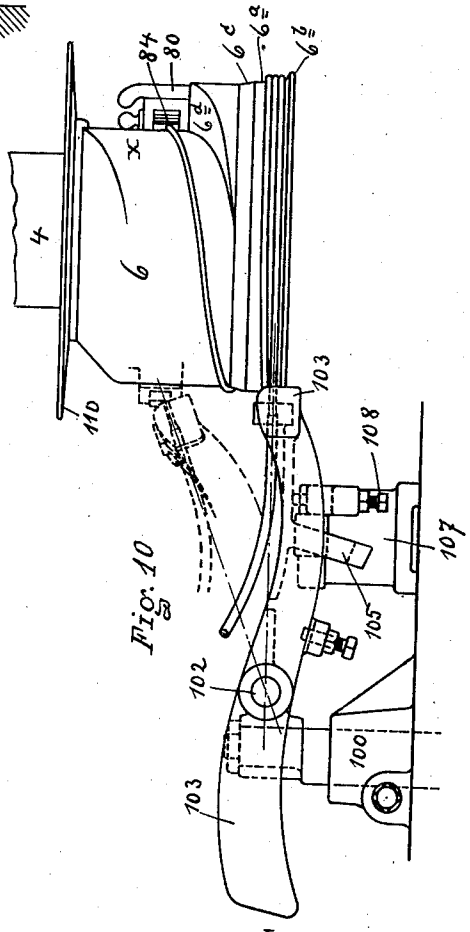

WITNESSES

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UNITED STATES PATENT OFFICE.

LESTER C. SMITH, OF ROME, NEW YORK, ASSIGNOR TO COE BRASS MANUFACTURING COMPANY, OF TORRINGTON, CONNECTICUT.

WIRE-DRAWING MACHINE.

980,569. Specification of Letters Patent. Patented Jan. 3, 1911.

Application filed July 6, 1903. Serial No. 164,286.

To all whom it may concern:

Be it known that I, LESTER C. SMITH, of Rome, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Wire-Drawing Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

The object of my invention is to provide an improved wire drawing machine, in which, among other things, provision is made for starting the wire at a reduced speed from that of the block, and gradually increasing its speed until it attains the speed of the block, and in providing a conveniently, easily and quickly manipulated means for grasping the end of the wire, and means for automatically disconnecting the block from the power and promptly stopping the rotation of the block under its own momentum when the wire breaks or terminates.

My machine is also constructed to provide for the easy and convenient removal of the wire from the draw block, and to provide a friction means in the driving mechanism, which will allow the block to slip, owing to its inertia at starting. There is also provided a die holder adapted to move from the axle line of the draw block to the periphery thereof, and follow the lines of force applied in drawing the wire.

Another feature which may be specified at this point is the mechanism for easily and conveniently stopping or starting the block by one lever, either for a regular run or for a trial pull.

Figure 1 shows a front elevation of a machine, embodying the features of my improvements. Fig. 2 is a side elevation of the same. Fig. 3 is a detail view relating to the clutch for driving and stopping the draw block. Fig. 4 is a detail view, showing more particularly the mechanism for promptly stopping the rotation of the draw block after the power has been disconnected. Fig. 5 shows an oil check, constituting a portion of the mechanism last mentioned. Fig. 6 shows on an enlarged scale, partially in side elevation, partially in sections, the mechanism for stopping and starting the draw block, and otherwise controlling its movements, and also the slip clutch or friction device for allowing the block to slip, owing to its inertia in starting. Fig. 7 shows details of the block controlling mechanism in a different position from that shown in Fig. 6. Fig. 8 shows the parts of the same mechanism from a point of view at right angles to that in which they are shown in Figs. 6 and 7. Figs. 9 and 9ª show details in sections of the friction clutch before mentioned. Fig. 10 shows inside elevation, the die-holding mechanism in connection with the draw block. In this figure, the parts are shown in position during the regular drawing operation of the machine. Fig. 11 shows a plan view of the die-holding mechanism, together with a partial section of the draw block. In this figure is shown in dotted lines the position of the parts at the commencement of the drawing operation, and in full lines the parts are shown at the point when the wire has just been brought up to speed of the draw block. Fig. 12 shows an end view of the die-holding mechanism; that is to say, as seen from the right of Figs. 10 or 11. Fig. 13 shows a plan view of the vise for grasping the end of the wire, which vise is mounted in the draw block. Fig. 14 shows a longitudinal section of the vise. Fig. 15 shows a partial cross section of the same.

Referring to the reference letters and figures in a more particular description, 1 indicates an upright and overhanging frame, which is secured on a suitable solid base 2, and is provided with bearings 3 and 4, which receive an upright shaft 5, which carries and drives the draw block 6. On the upper portion of the shaft 5, there is provided the comparatively large worm gear wheel (shown in dotted lines in Fig. 2), which wheel is driven by a worm wheel not shown, mounted on shaft 8, which shaft 8 carries the band pulley 9. The wheel 7 is preferably inclosed in a casing 10 formed in a portion of the upper part of the frame. The gear wheel 7 is not secured direct on the shaft 5, but is secured to a sleeve 7ª, which extends through the bearing 3, down to the friction clutch device hereinafter described, which is secured on the lower end of said sleeve.

Immediately below the bearing 3 is pro-

vided a friction or slipping clutch, consisting of the two main parts 11 and 12. The latter is secured to the sleeve 7^a, and the former adapted to turn free on the sleeve 7^a, and provided with clutch teeth 13 at its lower end. The parts 11 and 12 are each provided with circumferential flanges 11^a and 12^a respectively, between which there is placed a friction grid plate 14, having a series of openings, in which are placed removable friction blocks 15 of wood or other suitable material, which blocks project to some slight distance beyond the general surface of the plate 14. Between the said flanges 11^a and 12^a, there is also placed another plate or ring 16, preferably of metal. For clamping the parts 11 and 12 together, there is provided a ring 17, which encircles the flanges 11^a and 12^a, and is provided with an inwardly turned flange or shoulder portion 17^a. The shoulder 17^a is provided with a friction face 18 of wood or other suitable material. At the upper edge, the ring 17 is internally screw-threaded at 19 to receive the clamping ring 20, which ring 20 is provided with ears 21, by means of which it can be conveniently adjusted. The ring 17 is provided on its inner face at one or more points with internally projecting ribs 17^b, which engage in suitable grooves or notches in the periphery of the grid or friction plate 14, and the edge of flange 12^a, causing these three parts to rotate together.

The hub of the part 11 is provided with outwardly projecting ribs 11^b, which enter suitable notches in the inner edge of the plate 16, causing these two parts to rotate together.

It will be seen that in the construction described, a large area of renewable friction surface is provided on the parts 11 and 12 respectively, and that the amount of friction can be nicely regulated by adjusting the ring 20, so as to clamp the parts more or less tightly together.

Splined to the shaft 5, below the friction clutch device described, is a vertically movable clutch sleeve 25. At the upper end, this sleeve is provided alternately long and short teeth 26 and 27, adapted to engage with the teeth 13 on the slip clutch device before described. The long teeth 26 also serve to perform a further function, which will be referred to hereafter. The lower end of the sleeve 25 is also provided with at least one clutch tooth or projection 28. This tooth is adapted, when the sliding sleeve or clutch part 25 is in its lower position, to engage with or strike the short lever 29, which is pivoted on the shaft 5 immediately above the box 4. The lever arm 29 is provided for stopping the rotation of the block 6 after the power has been disconnected. The mechanism for accomplishing this purpose consists of a cylinder 30 pivotally connected at 31 to an arm or fixed portion of the frame, and a piston 32 and piston rod 33, connecting with the outer end of the said arm 29. Between the head of the cylinder 30 and the piston head 32, is provided a spring 34, coiled around the piston rod and serving to move the piston rod and parts connected therewith into the positions shown in Figs. 4 and 5. In connection with the cylinder 30, there is provided a chamber 35, which is connected at one side of the piston 32 with the cylinder by comparatively large and free passage way 35^a. At the head end of the cylinder, there is provided a comparatively small passage way, which is regulated or controlled by a ball valve 36, and a regulating screw 37, extending through the casing from the exterior. The chamber into which the passage controlled by the ball valve 6 opens directly, is connected by small by-pass 38, with the chamber 35. Into the head end of the cylinder at the lower side, there is also a port or opening 39, and the passage between the port 39 and the passage into the chamber 35 is controlled by the inwardly opening comparatively large valve 40. The chamber 35 and the connecting passages are to be kept full, or substantially full, of oil or some similar fluid. It will be noted that the piston rod 33 can be drawn out against the tension of the spring 34 with considerable rapidity, as the passage 35^a and port 39, with the valve 40 are of comparatively large area. On the return movement, however, which is produced by the expansion of spring 34, the movement is comparatively slow and can be nicely regulated, as the oil from the cylinder must pass through the opening controlled by the valve 36, and thence back by the by-pass 38 into the chamber 35.

For manually controlling the application of power to, or disconnecting it from the draw block, or, in other words, for manually controlling the operation of the clutch mechanism 25, the following mechanism is provided: A lever 50 is pivoted on the frame at 51, and arranged so that one of its arms will engage on the under side of the flange head 25^a of the clutch part 25. To the other arm of the lever 50, is attached a link 52, which, together with the link 53, to which it is pivoted, and which link 53 is pivoted at 54 to a fixed portion of the frame, constitutes a toggle joint construction. The link 53 is provided with an extension or arm 53^a, which is adapted to be engaged by the end of arm 55 of the operating lever 56. Lever 56 is pivoted at 57 on a vertical pivot, which permits a sidewise, or lateral swinging movement. The pivot 57 is on the counter-weighing end of lever 58, pivoted to the frame 59. The lever 58 has a limited amount of vertical swinging movement at

each end, and is attached at the forward end to the spring rod 60. The rod 60 passes in an upwardly direction through an opening in the pivot joint 61, between the lever 50 and the link 52, and is provided above this joint with the compressible spring 62. Mounted in the pivot 54, beside the link 53, is an irregularly shaped lever 70, the upper end of which is attached to a bolt 71, which slides freely through an opening in the frame, and when projected toward the front, is adapted to engage with the before mentioned long clutch teeth 26. The lower end of the lever 70 is, also, adapted to be engaged by the end of arm 55 before mentioned, to withdraw the bolt 71. The bolt 71 is projected so as to engage the clutch teeth 26 by a spring, which is contained in the bolt chamber *o* at the rear end, and shown in dotted lines in Fig. 2. For securing the bolt 71 in its re-tracted position, there is provided a catch 74, which consists of a lever heavy or weighted on the lower arm, and pivoted to the frame 75. The lower end of the catch 74 is in position to engage the side of the operating lever 56, as clearly seen in Fig. 8. And, it may be here noted that the lever 56 passes through a yoke 58[a], provided on the side of the lever 58. The operation of these parts is as follows: The normal position of the lever 56 is that shown by the upper dotted lines. The normal position of the lever 50, with the links 52 and 53, is that shown in full lines in Fig. 6. To raise the clutch part 25, and thus connect the power to the draw block, the operator depresses the lever 56 from the position in which it is shown in the upper dotted lines to the position in which it is shown in the lower dotted lines. From the position in which it is shown in upper dotted line, to the position in which it is shown in full line, the result is simply the compression of the spring 62. Immediately following the position shown in full lines, the arm 55 comes into operation, breaking the toggle joint between the links 52 and 53, letting the lever 50 move, and it is moved by the expansion of the spring 62, and the continued movement of the lever 56 until the parts are in the position shown in Fig. 7, with the clutch part 25 carried into its upper and engaging position. As soon as the lever 56 is released, the parts are returned to their normal position under the influence of the counter-weight of lever 58. The clutch part 25 is held in its upper position by frictional engagement of the clutch teeth 26 and 27 with the clutch teeth 13, as long as there is resistance to the rotation of the block 6, caused by the draw of the wire. If the wire breaks or terminates, this frictional resistance ceases, and the clutch part 25 drops down by its own gravity, thus automatically disconnecting the power. A spring might be provided for assisting this gravity movement, and in case the parts were employed in a horizontal machine (which I contemplate) a spring would become essential at this point. When the clutch part 25 drops down, as last described, the tooth 28, at the lower end of the clutch part, will come into engagement with the lever arm 29 of the stopping mechanism. As the block swings around, it is gradually brought to a halt by its power being imparted to the compression of the spring 34; when it has been brought to a halt, the block is rotated automatically back to a proper position to start drawing wire by the expansion of the spring 34 controlled by the fluid passages heretofore mentioned.

The draw block 6 is mounted on the lower end of the shaft 5, preferably so as to be readily detachable, and is provided at its lower end with what I term "the drawing face" 6[a]. At the lower end of the drawing face, there is provided a flange 6[b]. At the upper end of the drawing face 6[a], the size or diameter of the draw block is diminished, providing the bevel face 6[c]. In the side of the draw block, above the parts last described, is arranged the wire vise 80. This vise consists of a frame 81, mounted on a pivot or stud 82, which extends downwardly into a suitable socket in the base of the recess in the side of the draw block, in which the vise is located. On the under side of the body 81 is provided a stop projection 83, which is adapted to engage suitable shoulders of the draw block, and limit the swinging movement of the vise in either direction. The vise body 81 is chambered to receive the sliding jaws 84 and 85. The gripping ends of which are adapted to project somewhat from the side of the body. The jaws 84 and 85 are coupled together, so as to slide back and forth in the body by a cross pin 86, which is secured in one of the jaws and passes through a suitable opening in the other jaw. For opening the jaws, when they are forced back or inwardly, there is provided a wedging piece 87, secured in the bottom of the chamber of the vise body, and adapted to engage with inclined walls, provided on the bottom of the jaws. In order to provide for the convenient operation of the jaws, more particularly in opening them, to release the end of the wire, there is provided a handle piece 88, secured to the top on one of the jaws, and having a knob or handle 89. The jaws are closed by wedging in an opening in the end of the vise body, the outer walls of the jaws being inclined to coöperate therewith, and the jaws are impelled to or toward the closed position by the spring 90. One of the side walls of the body of the vise is continued up and made somewhat to overhang, forming a handle 91, by means of which the vise may be conveniently manipulated.

Extending from the face or surface, on which the vise 80 is mounted, and gradually narrowing, until it runs out in the cylindrical portion of the block, is the inclined way or track 6^a. The general surface of the block, immediately back of this inclined way and at the recess, which receives the vise, is considerably back or inside of the diameter of the cylindrical portion of the block, as indicated at x. This face x, against which the wire is adapted to draw, shortly after the machine starts, gradually runs out until it strikes the full diameter of the block. The arrangement of the vise on the draw block is such that when the general direction of the vise is in line with the diameter of the block, the gripping ends of the jaws will project slightly beyond the general circumference of the draw block, and afterward the block will swing into position, so that the jaws will substantially line up with the surface x, against which the wire draws.

The die-holding mechanism consists of a base 100, carrying an upright stud, on which is pivotally mounted the hanger 101. To the hanger 101 is pivoted on a transverse pivot 102 the die-holding arm 103, which has in its outer end 103^a a socket to receive the drawing die 104. On the underside of the die-holding arm 103, adjacent to the die socket, there is provided a downwardly projecting, cam projection 105. This cam projection is adapted to ride on a roller 106, mounted on a suitable base or stand 107. This base or stand in an arm also carries an upright set screw 108, capable of vertical adjustment, and adapted to support the arm 103 in operative position, and when it is not held or supported by the cam projection 105 resting on the roller 106. The operation of these parts of the machine are as follows: The operator swings his die-holding arm 103 into the position shown in dotted lines in Fig. 11. In this position it is somewhat elevated above its normal working position, by reason of the cam projection 105 resting on the roller 106. It is also lined up on the line between the pivot of the stand 100 and the axis of the draw block. In this position, the die-holder and die are lined up in position with the jaws of the wire vise, the block having been stopped, and returned to a proper position by the mechanism heretofore described. In case the wire vise is not found in proper position, the operator quickly brings it into operation by hand manipulation. The vise being pivoted to the draw block does not have to be supported by the operator and carried to the die, as in that class of machines where the tongs or vise is attached by a chain to the draw block, which chain also has to be drawn off or unwound from the block. By the use of the swinging die holder and the pivoted vise, the two can be brought almost instantly into substantially touching positions without practically any exertion by the operator. The wire to be drawn, the end of which, of course, has been reduced, as usual, is inserted through the die and forced in between the jaws, the jaws retiring somewhat under the pressure, and allowing the end of the wire to find position between the ends of the jaws. The draw block is then started by manipulating the power controlling mechanism heretofore described. The direction of the rotation of the block is shown by the arrow in Fig. 11, and while the block may start off at full speed, the wire is started at this most critical point of the draw with a slow and easy speed, which is gradually accelerated until the wire comes into the regular drawing position on the draw face 6^a immediately above the flange 6^b. As the wire is changed in the direction of the draw from a line directly between the pivot of the die-holder and the axis of the draw block to a line between the pivot of the die-holder and the periphery of the draw block, the die-holder swings around on its pivot, following the line of force, and, at the same time, it drops downwardly, bringing the wire onto the draw face 6^a. The wire reaches the draw face 6^a at the angle, between it and the flange 6^b, and as the operation is continued, the wire of the last coil crowds the preceding coils upwardly, until they are eventually crowded off from the face 6^a, and take a position in loose coils around the body of the draw block above the face 6^a. The upper end of the draw block may be provided with a flange plate 110, which will limit the upward movement of the coils of wire in case of accumulation of an excessive amount of wire on the block. When the wire brakes or comes to an end, the draw block immediately stops by the mechanism heretofore described. The natural spring and tendency of the wire to uncoil will cause the accumulated coil to enlarge sufficiently to pass the flange 6^b and the coil will immediately drop off from the draw block. The end, then, which had previously been engaged in the vise 80, may be released and the operation heretofore described repeated.

In case the operator wants to stop the draw block, when the wire has not broken or come to an end, and while the tension is still on, it is necessary to provide some means for forcibly disengaging the clutch part 25 from the clutch teeth 13. In order to do this, the operator swings the lever handle 56 sidewise. This serves to operate the catch 74 and release the lever 70, which, in turn, releases the bolt 71 and allows it to project toward the shaft 5 into the position shown in Fig. 4, where it will engage with the next long or large tooth 26, which comes to hand, and as the tooth passes under the projecting end of the bolt 71, the clutch part

25 will be forced downwardly and thereby the disconnecting of the power from the block accomplished.

The starting and stopping mechanism is also capable of another use, as follows: In drawing wire, it is often desirable to draw a short section and stop for the purpose of gaging the wire or otherwise. To accomplish this, in starting the machine and depressing the starting lever 56, as before described, it is first swung outwardly. This outward swing serves to release the catch 74, and allow the bolt 71 to project into its operative position as heretofore described. This outward swing also carries the end of the arm 55 to a position where it will not engage with the lever 70. Now, when the lever 56 is depressed, it will throw in the clutch part 25 and start the block, but one of the teeth 26 immediately comes into engagement with the bolt 71 and throws the clutch out, thereby promptly stopping the block.

It is evident that numerous modifications and changes in and from the construction herein described may be made without departing from the spirit of my invention.

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

1. The combination in a wire drawing machine of a rotary block, having a drawing face on its periphery, a vise pivoted on the block and located at one side of the drawing face and arranged to have the gripping jaws swing to the radial line of the block and swing to carry the wire into the periphery of the block, a die and die-holder pivoted to swing from a point with the die contiguous to, and in line with, the jaws when in radial position, to a point with the axial line of the die directed tangentially on the drawing face of the block, and means for supporting the die-holder in both of said positions, substantially as set forth.

2. The combination in a wire drawing machine of a drawing block, having a flange at its lower end, means for rotating and supporting the block in a suspended position at a sufficient elevation to allow the coil to drop off and be removed, and a drawing die and support therefor, substantially as set forth.

3. The combination in a wire drawing machine of a drawing block, having a flange at its lower end and a vise in its upper portion, and means for rotating the block and supporting it in suspended position to allow the coil to drop off, while the end thereof is held in the vise, and be removed, substantially as set forth.

4. The combination in a wire drawing machine of a frame, a vertical shaft, a wire drawing block mounted on the vertical shaft in position to allow the coil to drop off and be removed, a driving sleeve mounted on the upper portion of the shaft and having clutch teeth at its lower end and a sliding clutch member mounted on the shaft, and adapted to engage with the sleeve and to disengage by its own gravity, substantially as set forth.

5. The combination in a wire drawing machine of a frame, a suspended shaft mounted in the frame, a drawing block mounted on the lower end of the shaft and supported in position to allow the coil to drop off and be removed, means for driving the block and means for stopping the block, and a common clutch member longitudinally movable on the shaft, adapted to connect with the driving mechanism and disconnect from the stopping mechanism and vice versa, substantially as set forth.

6. In a wire drawing machine, the combination of a frame, a vertical shaft, a draw block supported on the lower end of the shaft in suspended position to allow the coil to drop off and be removed, a driving sleeve mounted upon the upper portion of the shaft, having clutch teeth at its lower end, a sliding clutch member mounted on the shaft, adjacent to said sleeve, and adapted to move longitudinally on the shaft to engage and disengage with the driving mechanism, a stopping mechanism and means on the opposite end of said clutch member for engaging the stopping mechanism and means for manually operating the clutch member, substantially as set forth.

7. In a wire drawing machine, the combination of a movable clutch member controlling the application of power to the wire drawing block, and the operating mechanism therefor consisting of the lever 50 pivoted to the frame, the toggle joint links 52 and 53, one of which, 52, is connected to the lever 50, the manually operated lever, the connection 60 between the lever and the joint between the lever 50 and link 52, and the spring 62 on the connection 60 and the breaking-down arm 55 of the manually operated lever adapted to engage one of the toggle joint levers, substantially as set forth.

8. The combination in a driving mechanism for a wire drawing machine, of a shaft, a driven sleeve having clutch teeth, a longitudinally movable clutch member on the shaft, and having teeth adapted to engage with the said clutch teeth of the sleeve to be automatically disengaged when relieved of tension, and a mechanical throwout for the same clutch member, consisting of a bolt adapted to be projected from the frame and inclined projections on the end of the clutch member with which the bolt is adapted to engage, substantially as set forth.

9. In a wire drawing machine, the combination of a wire block, a suspended spindle therefor, a sleeve inclosing the upper portion of said spindle, an upper clutch member on the lower end of said sleeve, a worm wheel on the upper end of said sleeve, a lower clutch member splined on said spindle,

a driven shaft, a worm on said shaft meshing with said worm wheel, and means for operating the clutch.

10. A wire drawing machine comprising a die, a revoluble vertically suspended wire block having a space beneath sufficient to permit lateral removal of a coil after being formerd thereupon, and means adapted to connect the wire with the block and capable of permitting release of the wire at the end of the drawing operation.

11. A wire drawing machine comprising a die, a revoluble vertically suspended wire block having a space beneath sufficient to permit lateral removal of a coil after being formed thereon, and a swinging vise on the block adapted to connect the wire with the block and to permit release of the wire at the end of the drawing operation.

12. A wire drawing machine comprising a die, a swiveled support therefor, means for preventing horizontal movement of said support when in its lowest position in one direction, but permitting movement in the opposite direction, a revoluble vertical wire block, and means on the wire block for engaging the wire passed through the die.

13. A wire drawing machine comprising a die, a support therefor pivoted so as to swing vertically, a revoluble vertically suspended wire block having a space beneath sufficient to permit lateral removal of a coil after being formed thereupon, the pivot of said support being substantially in the plane of the bottom of said block, and means adapted to connect the wire with the block and capable of permitting release of the wire at the end of the drawing operation.

In witness whereof, I have affixed my signature, in presence of two witnesses, this 3rd day of July 1903.

LESTER C. SMITH.

Witnesses:
S. E. JONES,
E. S. HESSE.