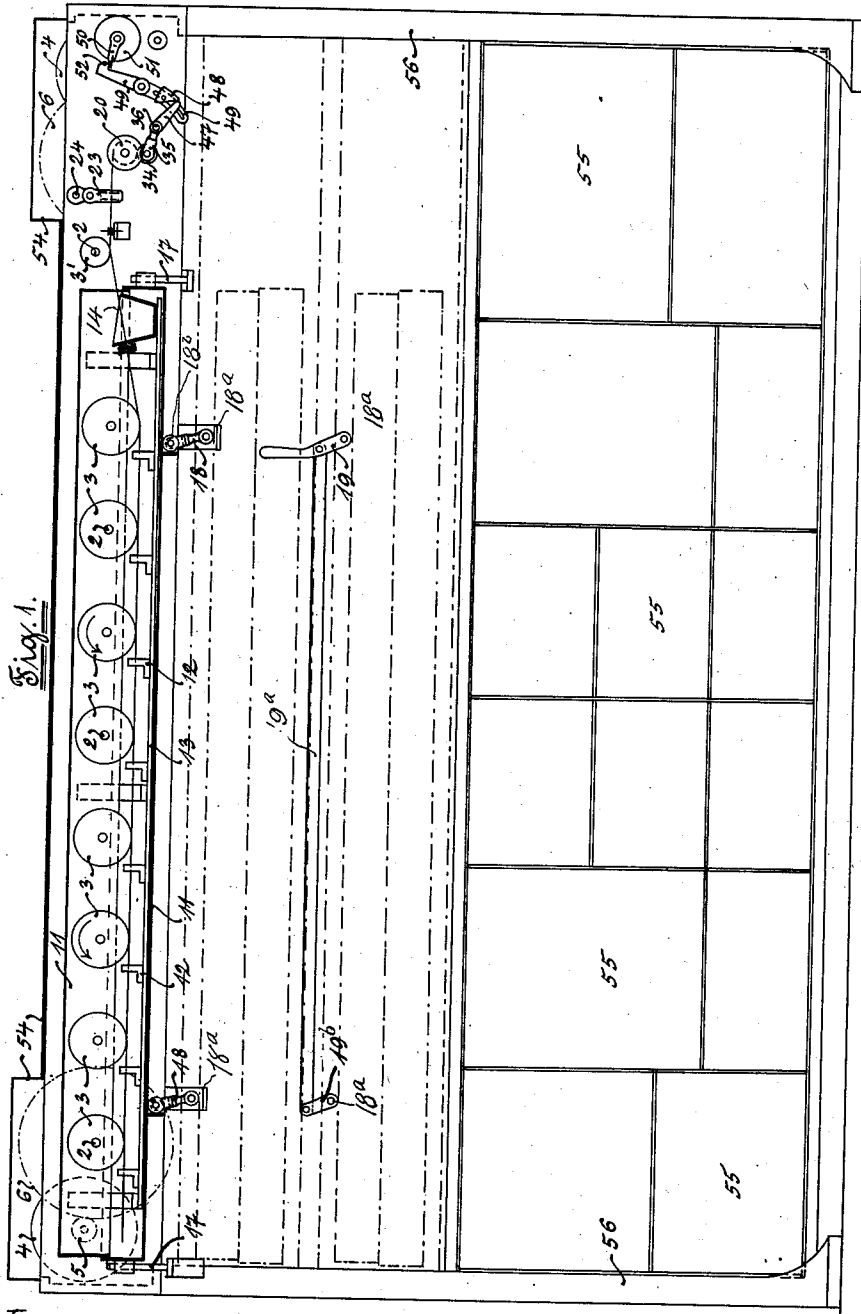


1,009,344.

3 SHEETS—SHEET 1.



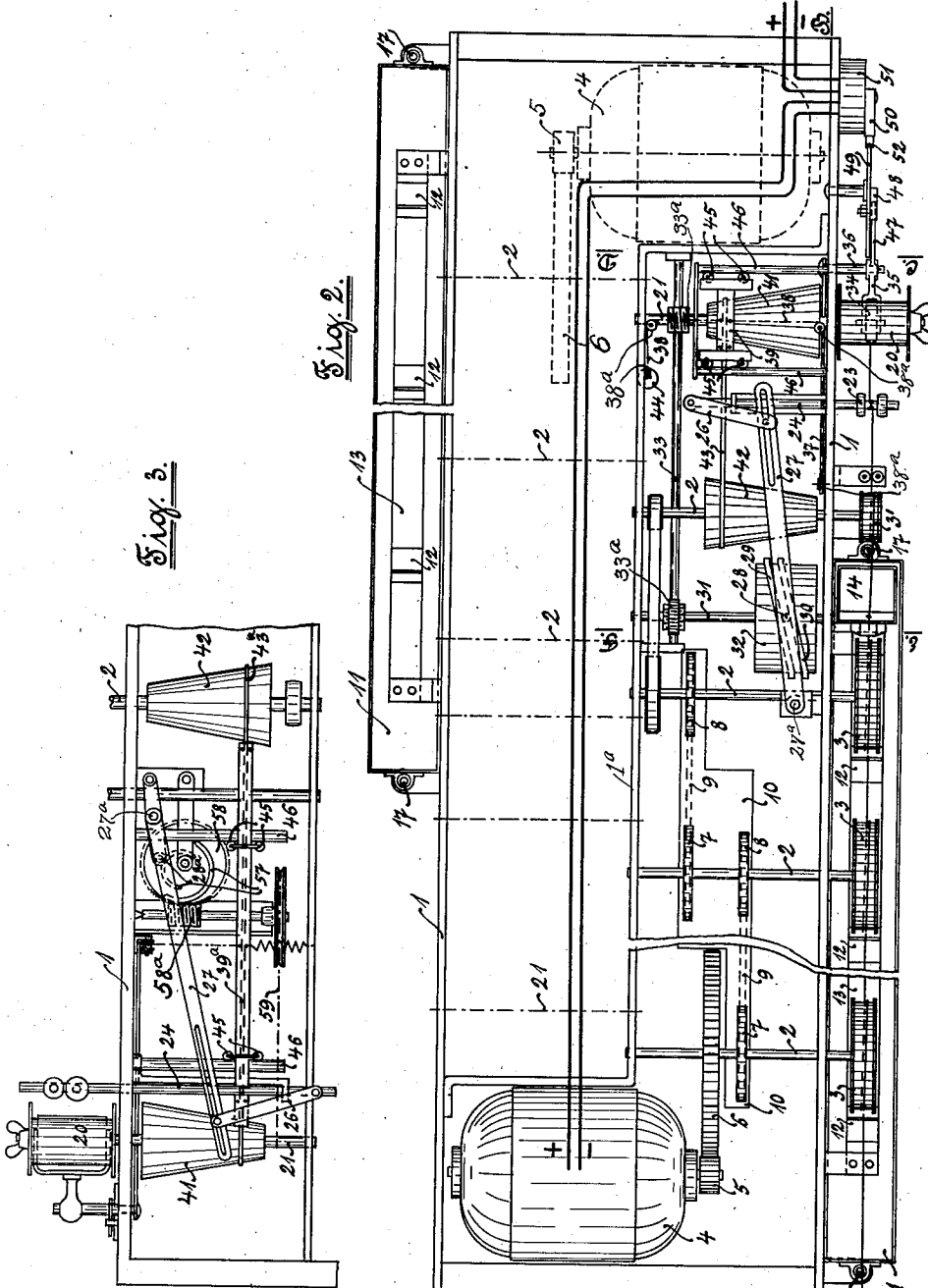
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E. ROLSHOVEN.
WIRE DRAWING MACHINE.
APPLICATION FILED FEB. 1, 1910.

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Patented Nov. 21, 1911.

3 SHEETS-SHEET 2.



Witnesses:
J. M. R. F.
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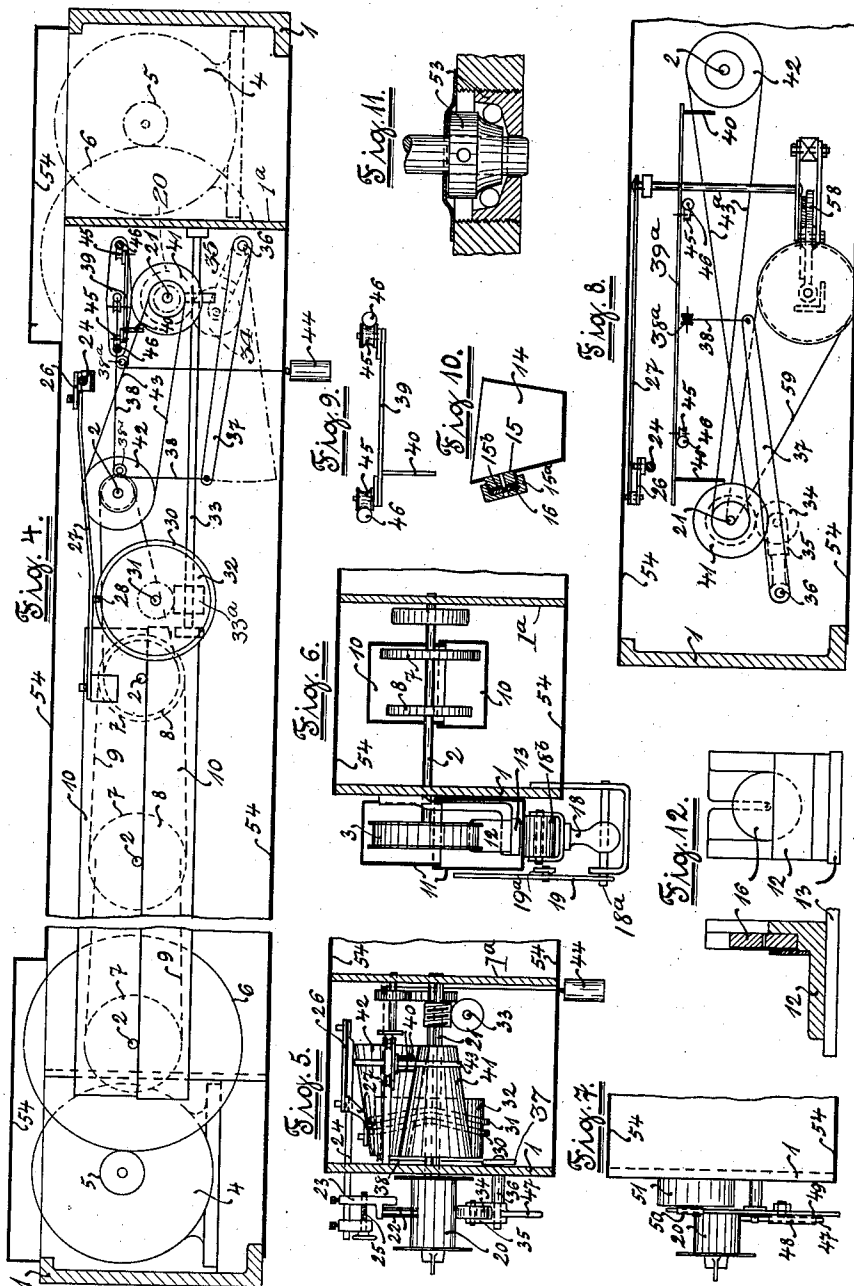
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UNITED STATES PATENT OFFICE.

EDUARD ROLSHOVEN, OF ALTENA, GERMANY.

WIRE-DRAWING MACHINE.

1,009,344.

Specification of Letters Patent. Patented Nov. 21, 1911.

Application filed February 1, 1910. Serial No. 541,383.

To all whom it may concern:

Be it known that I, EDUARD ROLSHOVEN, a subject of the German Emperor, and resident of Altena, in the Province of Westphalia, Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Wire-Drawing Machines, of which the following is a specification.

My invention relates to wire-drawing machines, and has for its object to provide a machine of this character which will be capable of a high speed, very durable, and compact in arrangement.

To this end, my invention consists of certain features of construction, and combinations of parts, that will be fully described hereinafter, and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved machine, with parts in section; Fig. 2 is a plan view with parts broken away; Fig. 3 is a partial plan view showing a traverse mechanism different from the one illustrated by Fig. 2; Fig. 4 is a side elevation of the upper part of the machine, drawn upon an enlarged scale, with parts in section on line A—B of Fig. 2; Figs. 5 and 6 are cross-sections on lines C—D and E—F of Fig. 2 respectively; Fig. 7 is a partial end elevation of the machine, looking from the right-hand end of Fig. 2; Fig. 8 is a longitudinal section of the traverse mechanism shown in Fig. 3; Fig. 9 is a detail elevation showing part of the traverse mechanism of Figs. 2 and 4; Fig. 10 is a detail vertical section of a device for removing oil from the finished wire; Fig. 11 is a detail horizontal section of a roller bearing, and Fig. 12 shows one of the wire-drawing dies and its holder, in longitudinal section and in end elevation.

In the frame 1 of the machine are journaled the shafts 2 of the drawing drums 3 and of the feed drum 3'. As shown in Fig. 2, a U-shaped partition 1^a divides the frame into two sections, each of which contains a complete wire-drawing mechanism. Inasmuch as these two mechanisms are identical (except as to position of their parts), only one of them has been illustrated in full, the other, occupying the upper and the right-hand portions of Fig. 2, being indicated by some of its parts only. The two mechanisms

are entirely independent each having its own driving power, such as an electromotor 4 which by means of gearing 5, 6 drives the shaft 2 of the first drawing drum 3 of the series, while suitable transmission mechanism, such as sprocket wheels 7 and 8, and chains 9, is provided to operate the remaining drawing drums 3 and the feed drums 3'. The transmission should be such that each drum 3 rotates at a higher rate of speed than the preceding one, and that the ratio of such speed-increase is constant. In other words, with the particular drive shown, the ratio of the diameters of directly connected wheels 7, 8 should be the same for each pair. In order to insure an easy and noiseless running of the transmission mechanism, I prefer to arrange it in an oil-bath, contained in a tank 10 provided with a cover and completely closed. The drawing mechanism proper is also immersed in a liquid, contained in a tank 11 provided with a cover, the drawing drums 3 dipping into said liquid to about one-third of their diameter, as indicated by the upper dotted line in Fig. 1. With the drums 3 are combined a suitable number of draw-plates or dies 16 (Fig. 12) removably carried by holders 12 which are fastened on the frame 1 within the tank 11 so as to be immersed in the liquid, the hole in each die being at the same level with the lowermost part of the drawing drums. The wire is thus led through the machine in a horizontal line at a speed which increases to compensate for the lengthening of the wire due to the progressive reduction of its diameter. The drums 3 rotate at a high speed in the direction indicated by arrows in Fig. 1, and in this manner the liquid is brought with great force against the drawing dies, thus cooling them and washing out the die-openings so as to prevent them from becoming smaller, this being very important on account of the high speed of the machine.

Within the tank 11, and in the path of the wire after its passage through the last die 16, is located a small box 14 (Figs. 1 and 10) with a nipple 15 and cover 15^a, screwed together and provided with a washer 15^b; the liquid adhering to the wire is thus retained on the outside of the cover 15^a and drops back into the tank 11, the wire being thus dried before it reaches the winding mechanism described hereinafter.

In order that access may be had to the dies and drawing drums when desired, the tank 11 is movable vertically along guides 17, the position of the tank being controlled by levers 18 fulcrumed at 18^a and carrying rolls 18^b which engage the bottom of the tank (see Fig. 1). One of the levers 18 is connected rigidly with an operating lever 19, while a rod 19^a and an arm 19^b, rigidly connected with the other lever 18, insure a parallel motion of both levers. Fig. 1 also indicates that a plurality of drawing mechanisms of the character described may be superposed upon the same frame 1; these mechanisms being identical, only the upper one has been shown in detail, the two lower ones being simply indicated by dotted lines corresponding to their tanks 11. The lower drawing mechanisms may be entirely independent of the upper ones, or some of them may be operated by the same motor. The feed drum 3' is located outside the tank 11 and at a higher level than the other drum, so that the wire passes upward, the box 14 serving chiefly to keep the wire out of contact with the liquid after the wire has passed through the cleaning device formed by the nipple 15, washer 15^b, die 16 and cover 15^a. The finished wire is wound on a spool 20 mounted on the shaft 21. To enable the wire to be spooled evenly, a suitable traverse mechanism is provided, two forms of which are shown in the drawings.

According to the construction represented in Figs. 2, 4 and 5, the wire is guided by pins 22 projected from a holder 23 which, by means of a screw 25, may be adjusted lengthwise of a sliding rod 24. After adjustment, the holder is fastened, as by means of a set-screw. The rod 24 and the pins 22 are reciprocated lengthwise of the spool 20 by means of a lever 26 one end of which has a loose connection with the rod 24 while its other end has a pin fitted into a longitudinal slot of another lever 27 fulcrumed at 27^a and swung alternately in opposite directions by means of cam ribs 29, 30 embracing a pin 28 on the lever 27. The ribs 29, 30 are secured to a rotary drum 32 mounted rigidly on a shaft 31 which is rotated at a rate of speed constant with reference to that of the spool shaft 21. That is to say, the shafts 21 and 31 are connected to preserve the same relative speeds, as by means of a shaft 33 and worm gearing 33^a.

The longitudinal slot of the lever 27 is provided for the purpose of allowing the lever 26 to be adjusted so as to vary its throw and thereby the course or stroke of the rod 24 so that spools 20 of different widths may be employed, the lever 26 being set accordingly every time a spool of a different width is substituted. Insomuch as the last drum 3' (at the right in Fig. 1) draws the wire through the cleaning cover 15^a and

the last die 16 and feeds it to the spool 20, the wire is not subjected to any longitudinal strain while being spooled.

In view of the fact that the diameter of the coil of wire on the spool 20 increases progressively, while the linear speed of the wire as it is fed to said spool is constant, it is clear that provision should be made for a corresponding gradual reduction of the spool's rotary velocity. For this purpose a small roller 34 (Figs. 1, 4 and 5) is provided under the spool 20 to engage the spool, or the wire coiled thereon, this roller being carried by an arm 35 upon a rock-shaft 36. Said shaft carries another arm 37, from which a string, chain, or other flexible connection 38 is passed over suitable guides or pulleys 38^a to a rod 39 provided with a fork 40 determining the position of a belt 43 extending around the cone drums 41, 42, one of which is mounted rigidly on the shaft 21 of the spool 20 and the other on the shaft 2 of the feed drum 3'. A weight 44 connected with the rod 39 by the chain 38 or the like, pulls it in such a direction as to press the roller 34 upward against the spool 20. The rod 39 is mounted to move parallel with the axes of the drums 41, 42, and as shown said rod forms part of a carriage provided with rolls 45 adapted to travel on stationary guide rods 46 parallel with the shaft 21 (Figs. 2 and 9). Since the drums 41, 42 taper in opposite directions it follows that while the length and tension of the driving belt remain the same, the speed ratio will vary as the belt is shifted transversely. Therefore, with the drum 42 having a constant number of revolutions, the drum 41 and the spool 20 will be rotated at a gradually reduced speed as the wire accumulating on the spool causes the rock shaft 36 to swing and the carriage with the rod 39 and belt-guiding fork 40 to be shifted. Since, as above described, the traverse rod 24 is operated by mechanism which (through the shafts 31 and 33) is governed by the shaft 21 of the spool 20, it follows that the speed of the traverse mechanism will be altered in the same ratio as that of said spool, thus insuring a proper timing of the traverse mechanism, that is, an even winding of the wire on the spool, notwithstanding the varying speed of such spool.

The following stop mechanism can be provided (independently) for each series of drawing drums. On the rock-shaft 36 is secured a third arm 47 (Figs. 1, 2 and 5) adapted to engage a stop 48 upon a lever 49. Preferably the lever is slotted to provide for a longitudinal adjustment of the stop. A hook 52 at the end of the lever 49 normally holds the arm 50 of the motor controller 51 in the position in which the current is switched on. A spring or other device (not shown) will throw the con-

troller, as soon as it is released from the hook 52, in such a manner as to break the circuit and stop the motor. When a certain amount of wire has been coiled on the spool, the arm 47 will, by engaging the stop 48, swing the lever 49 so as to release the switch arm 50 and cause the circuit to be broken. If desired, an alarm bell may be operated at the same time; the necessary arrangement being readily made by any electrician of ordinary skill. The adjustability of the stop 48 permits the motor to be stopped automatically either after the spool 20 has received wire to its full capacity, or only a predetermined fraction of such capacity.

Ball bearings with cones and cups 53 (Fig. 11) may be provided for the rotary parts of the machine, and particularly for the several shafts.

The dies 16 being removable from their holders 12, this facilitates the threading of the wire through them. (Fig. 12.)

The mechanism is entirely inclosed in a casing 54 so that the operation is not visible. The lower portion 56 of the frame constitutes a cupboard divided into compartments 55 to receive spools, wire, tools, etc. These compartments may be provided with doors.

As hereinbefore referred to, Figs. 3 and 8 represent a slightly different mechanism for actuating the traverse device (the reciprocating rod 24). The parts 20, 21, 24, 26, 27, 28^a, 34, 35, 36, 37, 38, 39^a, 41, 42, 45 and 46 shown in these views are practically of the same construction as described above. The belt 43^a is crossed, and the position of the parts is slightly altered, without however affecting their operation. The pin 28 of the lever 27 is engaged and moved by eccentric guides 57 on a worm wheel 58 driven from the shaft 21 by means of a worm 58^a and a string or belt 59, or any other suitable connection. This causes the lever 27 to be reciprocated in the same manner as hereinbefore described, always in proper time with reference to the rotation of the spool 20.

By reference to Fig. 2 it will be seen that a very compact arrangement is obtained by locating the two mechanisms in the L shaped compartments which are formed in the frame 10 by the L-shaped partition 10^a. The motor is placed in the short end member of the L, and the driving mechanism in the long side member. The two L compartments are placed reversely, the free end of each longitudinal member fitting into the corner at the junction of the members of the other compartment. Together, the two compartments have a rectangular outline, so that a very perfect utilization of the available space is obtained.

Various modifications may be made without departing from the nature of my invention as defined in the appended claims.

I claim as my invention:

1. A wire-drawing machine provided with dies and drawing drums, a spool on which the finished wire is adapted to be wound, a device for drying the wire on its passage from the last drawing drum to said spool, and a feeding device engaging the wire between the drying device and the spool.

2. A wire-drawing machine provided with dies and drawing drums, a tank in which said dies and drums are located, a drying device through which the wire is adapted to pass after leaving the last drawing drum, and a box located within the tank on the delivery side of the drying device, and means for leading the wire upward within said box to a point above the normal level of the liquid in the tank.

3. A wire-drawing machine comprising mechanism for drawing the wire, an exchangeable spool for receiving the drawn wire, a guide for leading the wire to the spool, a slide to which said guide is secured, arranged to reciprocate lengthwise of the spool, a lever operatively connected with the slide, a second lever, means for oscillating the second lever, and an adjustable operative connection between the two levers to allow the throw of the first-named lever to be varied while the throw of the second lever remains constant.

4. A wire-drawing machine comprising mechanism for drawing the wire, a spool for receiving the drawn wire, traverse mechanism for distributing the wire evenly on the spool, mechanism for driving said spool at varying rates of speed, a movable device arranged to engage the coil of wire on the spool and having an operative connection with said driving mechanism to vary the spool's rate of speed as the coil of wire increases in diameter, and an operative connection between the said spool and the traverse mechanism so that the speed of the latter will vary in the same ratio as that of the spool.

5. A wire-drawing machine comprising mechanism for drawing the wire, a spool for receiving the drawn wire, traverse mechanism for distributing the wire evenly on the spool, oppositely tapered pulleys one of which rotates with the spool, driving mechanism connected with the other pulley, a belt connecting the two pulleys and movable lengthwise thereof, a belt-shifting carriage movable lengthwise of said pulleys, a movable device arranged to engage the coil of wire on the spool and having an operative connection with the said carriage to vary the spool's rate of speed as the coil of wire increases in diameter, and an operative connection between the spool and the traverse mechanism so that the speed of the latter will vary in the same ratio as that of the spool.

6. A wire-drawing machine comprising

mechanism for drawing the wire, a spool for receiving the drawn wire, a movable device arranged to engage the coil of wire on the spool, and means, controlled by said device, for varying the rotary speed of the spool as the coil of wire increases in diameter.

7. A wire-drawing machine comprising mechanism for drawing the wire, a spool for receiving the drawn wire, oppositely tapered pulleys one of which rotates with the spool, driving mechanism connected with the other pulley, a belt connecting the two pulleys and movable lengthwise thereof, a belt-shifter movable lengthwise of the pulleys, a movable device arranged to engage the coil of wire on the spool, and an operative connec-

tion from said device to the belt-shifter to vary the spool's rotary speed as the coil of wire increases in diameter.

8. A wire-drawing machine comprising mechanism for drawing the wire, a spool for receiving the drawn wire, a roller adapted to engage the wire coiled on said spool, a rocking arm carrying said roller, another arm held to move in unison with said rocking arm, a lever provided with a stop adapted to be engaged by the last-named arm, and stop mechanism controlled by said lever.

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