(No Model.) 3 Sheets—Sheet 1.

H. SMITH.

WIRE DRAWING MACHINE.

No. 405,378. Patented June 18, 1889.

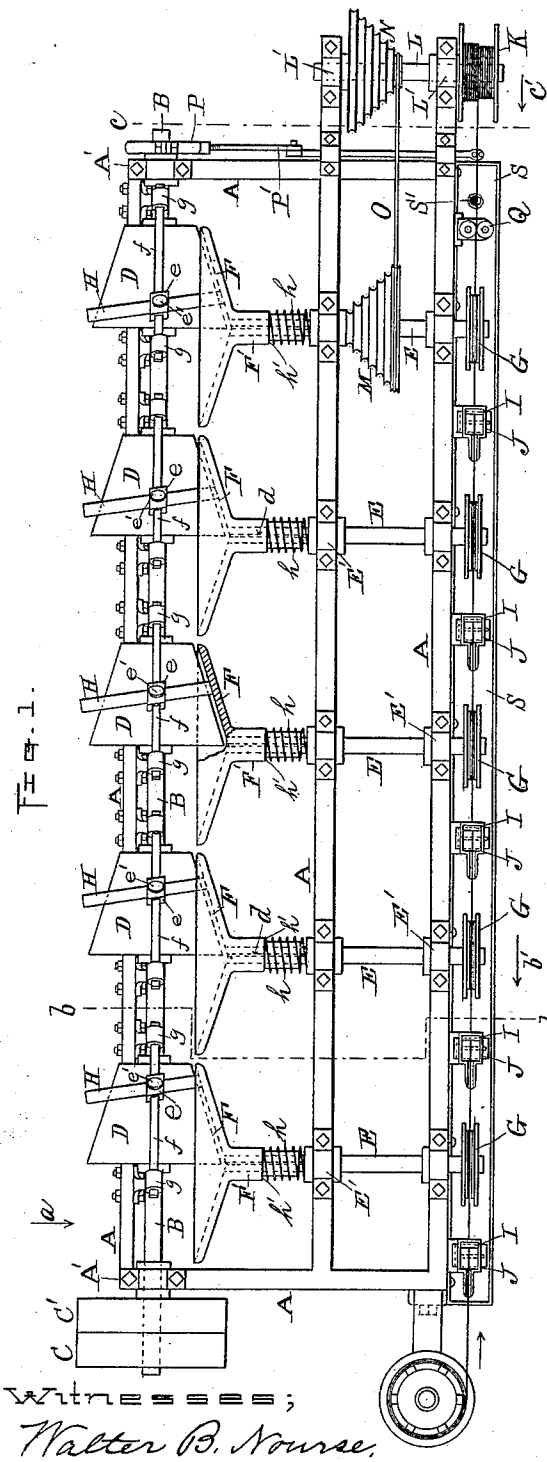


Fig. 1.

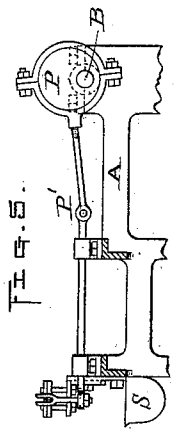


Fig. 5.

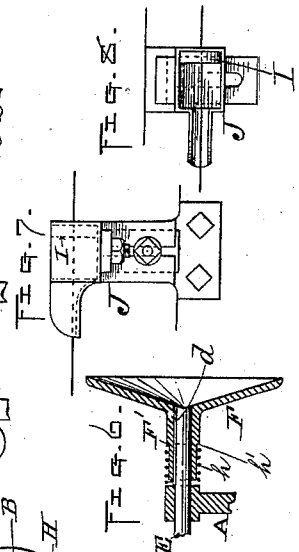


Fig. 6.

Fig. 7.

Fig. 8.

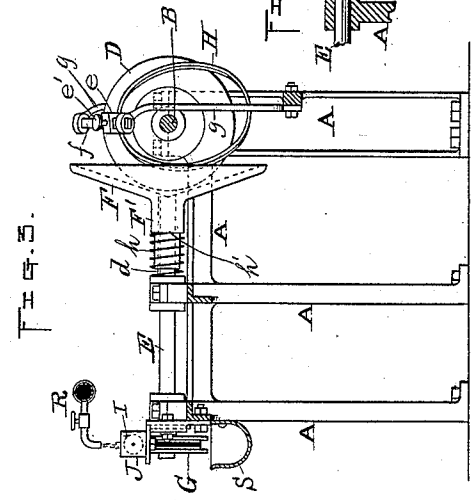


Fig. 3.

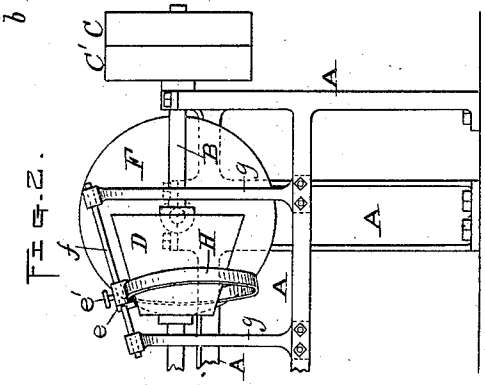


Fig. 2.

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(No Model.)

3 Sheets—Sheet 2.

H. SMITH.

WIRE DRAWING MACHINE.

No. 405,378. Patented June 18, 1889.

Fig. 4.

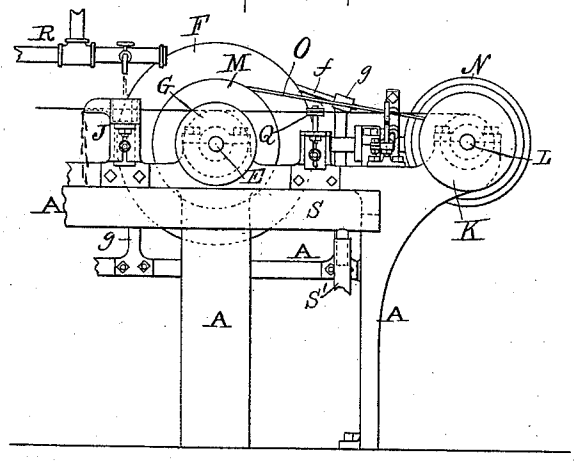


Fig. 9.

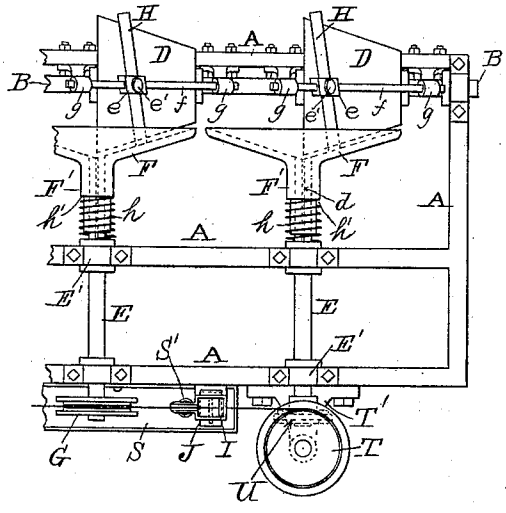
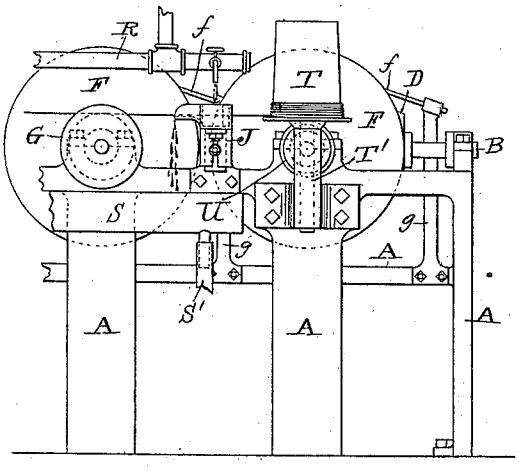


Fig. 10.



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(No Model.) 3 Sheets—Sheet 3.

H. SMITH.

WIRE DRAWING MACHINE.

No. 405,378. Patented June 18, 1889.

Fig. 11.

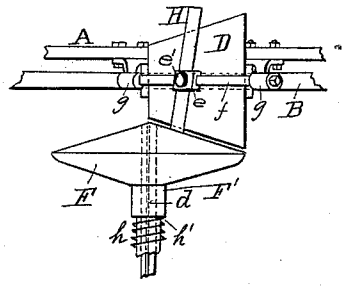
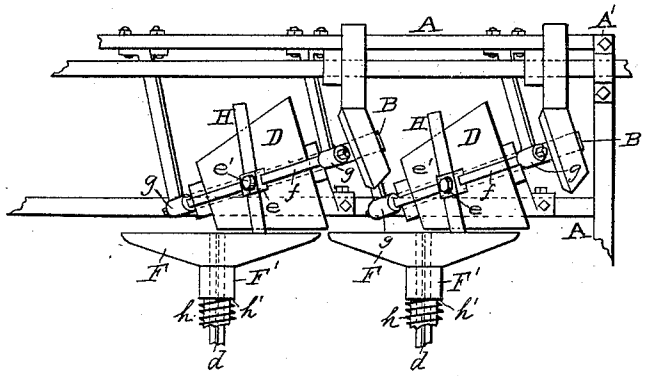


Fig. 12.



Witnesses;
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Inventor;
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N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

HERBERT SMITH, OF WORCESTER, MASSACHUSETTS.

WIRE-DRAWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 405,378, dated June 18, 1889.

Application filed January 23, 1889. Serial No. 297,248. (No model.)

To all whom it may concern:

Be it known that I, HERBERT SMITH, of the city and county of Worcester, and State of Massachusetts, 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, reference being had to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 represents a plan view of a wire-drawing machine, partly in section, embodying my improvements. Fig. 2 is a side elevation of part of the machine at one end thereof, looking in the direction of arrow *a*, Fig. 1. Fig. 3 is a transverse section through said machine, taken on line *b*, Fig. 1, looking in the direction of arrow *b'*, same figure. Fig. 4 is a similar view to Fig. 2 of the opposite side and opposite end of the machine. Fig. 5 is a transverse section through said machine, taken on line *c*, Fig. 1, looking in the direction of arrow *c'*, showing a side view of the device for distributing the finished wire over the spool upon which it is wound. Fig. 6 is a longitudinal section through one of the concave driven disks, its hub, and the bearing next to said hub, hereinafter more fully described. Figs. 7 and 8 are a side view and plan, respectively, of one of the dies and die-holders, the same being shown upon an enlarged scale. Figs. 9 and 10 represent a plan and side view, respectively, of one end of the machine, showing a modification hereinafter more fully specified; and Figs. 11 and 12 show other modifications in the construction, which will also be hereinafter more fully described.

My invention relates to wire-drawing machines having a series of dies through which the wire is drawn and reduced several sizes by a continuous operation; and it consists in the combination of various elements operatively combined together for attaining said result, as hereinafter set forth, the machine being designed more particularly for drawing the finer grades of wire, requiring a smooth and even draft and delicate adjustment in said drawing operation, to produce wire of the desired quality and finish, and to effect said desirable result is the main purpose of my invention.

I am aware of the United States Patent to M. F. Roberts, No. 377,864, dated February 14, 1888, and make no claim to the features therein set forth, the object of this invention being to effect improvements on said machine to produce the results above specified.

In order that others may fully understand the nature and purpose thereof, I will now proceed to describe it more in detail.

Referring to the drawings, A represents the main frame, made of the proper form to support the various operating parts. In suitable bearings A' A' in said frame is fitted to turn the main driving-shaft B, arranged longitudinally and having the fast and loose pulleys C C' secured to one end thereof, which may be connected with any suitable driving-power to operate said main shaft B, and from thence the whole machine. A series of friction cone-pulleys D are also secured to said main shaft, preferably equidistant apart.

At right angles, or substantially so, to the main shaft B are arranged to turn in suitable bearings E' in the main frame a series of shafts E, one for each cone. Said shafts E have mounted upon one end the concave friction-disks F, and at their opposite ends the drawing-through pulleys G, the latter being secured thereto and the disks so as to turn therewith, as well as to slide longitudinally thereon, each disk being provided with a hollow hub or sleeve F', fitted over the shafs E and held from turning thereon, but not from sliding longitudinally, by a feather-key *d*, engaging with said shafts and sleeves. Any other equivalent construction for effecting the same result may be employed, if preferred.

The angle of the face of each concave disk F is made to correspond to that of the cone-pulleys, and between said concave face of each friction-disk and the surface of each cone is interposed a friction-belt H, whereby the contact-point between each pair of disks and cones may be varied, so that the speed may be increased or decreased, as desired, to properly draw and take up the wire in the treatment thereof as it passes continuously through the machine, the speed being increased by moving said belts toward the large ends or bases of the cones and centers of the disks and decreased by reversing said move-

ment. By thus combining a cone D with the face of a disk I am enabled to obtain a larger range of adjustment to vary the speed of the drawing-through pulleys G than by the use of a cylindrical disk or body, as in the patent cited, a continual variation of speed being obtained by means of the belt throughout the length of each of said cones, in addition to that obtained by moving said belts toward and from the axes of the disks.

If desired, the disks F may be made convex instead of concave in shape, the only change thereby necessitated in the construction being to arrange the cones upon the opposite sides of the axes of said disks, as shown in Fig. 11; or said disks may be made with flat faces by mounting the cones on separate shafts to bring the faces thereof parallel to the faces of the disks, as shown in Fig. 12, without departing from the principle of my invention.

The combination of the friction-cones with suitable friction-disks, the belts arranged between them, and other parts described, constitutes the main or essential feature of my invention, and it is not material whether said cones be mounted upon and driven by one continuous shaft, as shown, or upon separate shafts, said driving mechanism not constituting a part of the invention. The construction shown is preferable, however, in practice, on account of thereby effecting an economy of space, as well as cost in the construction of the machine.

The adjustment of the belts H to vary the speed, as above described, may be performed by any suitable shipping device. In this instance I have shown each belt passed through a slotted slide *e*, provided with a set-screw *e'*, and fitted to slide longitudinally on a fixed rod or bar *f*, preferably arranged at an angle (see Fig. 2) corresponding to the angle of the cone and fastened to the tops of stationary standards *g g*. When it is desired to move the belt in either direction to change the speed, the set-screw is turned back, said adjustment made, and then fastened by turning up the screw again against the bar on which the slide is mounted. A constant pressure of the disks F against the belts H and cone-pulleys D is exerted, so that the driving-power of said pulleys may be transmitted to the disks and other parts, by means of a suitable spring properly interposed between said disks and some fixed point to effect said result. In this instance I have shown a spiral spring *h* arranged over the hub or sleeve of each disk, having a bearing at one end against the shaft-bearing E or frame A, and at its other end against a shoulder *h'* on said hub or sleeve.

About midway between the drawing-through pulleys G, and in line therewith, are arranged the reducing-dies I, which are supported and held in position by the die-holders J, (best shown in Figs. 7 and 8,) secured to frame A. As said pulleys, dies, and die-holders are fully set forth and shown in a prior application and constitute no independent part of my present invention, it is deemed unnecessary to further describe the same.

The finished wire is wound upon a spool K, as fast as completed, in smooth regular coils, one over another, ready for shipment. Said spool is preferably arranged horizontally, and is mounted on a short shaft L, fitted to turn in suitable bearings L' in frame A. It is driven and the speed thereof regulated by means of the cone-pulleys M N and endless belt O, one pulley being upon the spool-shaft and the other on the first shaft E from that end of the machine.

In order that the finished wire may be evenly distributed over the spool from one end to the other, with one coil over another, as previously stated, I employ a suitable device for moving the wire laterally forward and back the length of the spool just before reaching said spool. In this instance I accomplish said result by means of an eccentric P on the main shaft B, through the jointed connecting rod or pitman P', guided in suitable bearings in frame A, and having an opening or forked end to hold the wire and at the same time allow it to pass through. It is obvious that many equivalent devices might be employed to effect the same result, and I therefore do not limit myself thereto or to the mode of driving and regulating the speed of the spool K.

A pair of friction guide-rolls Q are preferably employed between the last drawing-through pulley G and the wire-distributing device previously described, so as to keep the wire in alignment with the drawing-through pulleys and dies for a short distance beyond said last pulley.

The lubricating-fluid employed in the drawing operation may be supplied to the dies from a suitable supply-pipe R above (see Figs. 3, 4, and 10) and the waste discharged into a trough S, and from thence through a discharge-pipe S' underneath, in the usual way.

Although this machine is designed more especially for treating the finer grades of wire, which, when spooled, as previously specified, is finished and ready for shipment, it is also applicable as well to the treatment of the wire at a less advanced stage in its manufacture and requiring other subsequent treatment after leaving said machine. When such subsequent treatment is required, instead of employing a spool K and its actuating mechanism, as previously described, a wire-block T is used, as shown in Figs. 9 and 10, upon which the wire is wound. In this instance the distributing device is dispensed with and said block combined with the last shaft E of the series, or the shaft from which the power is transmitted to the spool in the other case. The block is fitted to turn in a suitable bearing T', secured to frame A, and rests upon a friction disk or pulley U, secured to said

shaft E, thus transmitting by friction the driving-power of the shaft to the block to turn the same.

When the machine is adapted to produce the wire in a finished state and said wire is spooled, as aforesaid, a saving of about three cents per pound is effected over the other way of partially finishing said wire and coiling it upon a wire-block, and is consequently the most desirable to adopt in practice. My invention being applicable to either method, I reserve the right to combine the same with both the spool and its actuating mechanism, as well as the block and its connections, as previously specified.

By constructing a wire-drawing machine in the manner herein set forth it is obvious that the speed of the various drawing-through pulleys and the spool or block may be regulated to a nicety. Therefore a steady even draft is at all times maintained upon the wire, free from any jerks or intermittent motions, the advantages of which will at once be apparent to those skilled in the art, especially in treating the class of wire previously referred to. Wire is thereby produced of superior quality, of a uniform size and smoothness throughout.

I make no claim, broadly, to any of the separate elements or instrumentalities employed in carrying out my invention, as I am aware that they have heretofore been used in other machines, and limit my invention to the combinations thereof as pointed out in the claims.

What I claim, and desire to secure by Letters Patent, is—

1. In a wire-drawing machine, the combination of the series of friction driving-cones D, friction-driven disks F, adjustable friction-belts H, arranged between said cones and disks, the drawing-through pulleys, and suitable means for supporting and operating the various parts, substantially as and for the purpose set forth.

2. In a wire-drawing machine, the combination of the series of friction driving-cones D, friction-driven disks F, adjustable friction-belts H, arranged between said cones and disks, the drawing-through pulleys, the reducing-dies, and suitable means for supporting and operating the various parts, substantially as and for the purpose set forth.

3. In a wire-drawing machine, the combination of the series of friction driving-cones D, friction-driven disks F, adjustable friction-belts H, arranged between said cones and disks, the drawing-through pulleys, the reducing-dies, the spool or block upon which the finished product is coiled, and suitable means for supporting and operating the various parts, substantially as and for the purpose set forth.

4. In a wire-drawing machine, the combination of the series of friction driving-cones D, friction-driven disks F, adjustable friction-belts H, arranged between said cones and disks, the drawing-through pulleys, the reducing-dies, the spool upon which the finished product is coiled, a wire-guide for properly distributing the wire over said spool, and suitable means for supporting and operating the various parts, substantially as and for the purpose set forth.

5. In a wire-drawing machine, the combination of the shaft E, driven from the main shaft B through the friction-cone D, friction-belt H, and friction-disk F, and having the cone-pulley M thereon, with the belt O, cone-pulley N, shaft L, spool K, and frame A, substantially as set forth.

6. In a wire-drawing machine, the combination of the shaft E, driven from the main shaft B through the friction-cone D, friction-belt H, and friction-disk F, and having the cone-pulley M thereon, with the belt O, cone-pulley N, shaft L, spool K, a wire-guide operated from the main shaft through suitable connections for guiding the wire laterally from one end to the other of the spool as it is being coiled thereon, and frame A, substantially as set forth.

7. In a wire-drawing machine, the wire-guide operated from the main shaft through an eccentric on said shaft, and a jointed rod or pitman fitted to slide next to the wire in stationary bearings, substantially as set forth.

8. The combination of the shaft E, its bearings E′ on frame A, and friction-disk F, having the hub or sleeve F′ and fitted to slide longitudinally on said shaft E, with the feather-key *d* and spring *h*, substantially as and for the purpose set forth.

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Witnesses:
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W. B. NOURSE.