

(No Model.)

2 Sheets—Sheet 1.

A. W. FOSTER.
MACHINE FOR DRAWING METAL.

No. 527,486.

Patented Oct. 16, 1894.

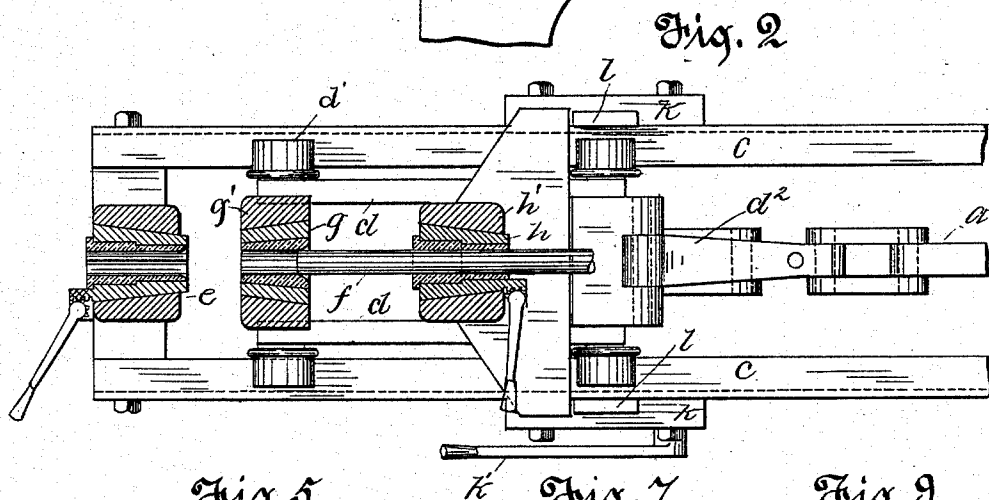
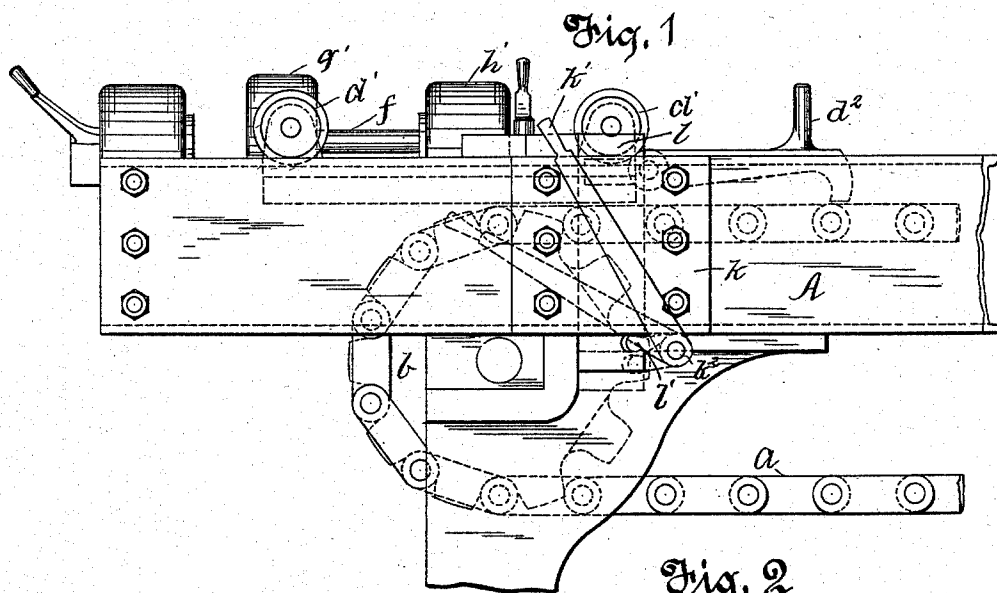


Fig. 5

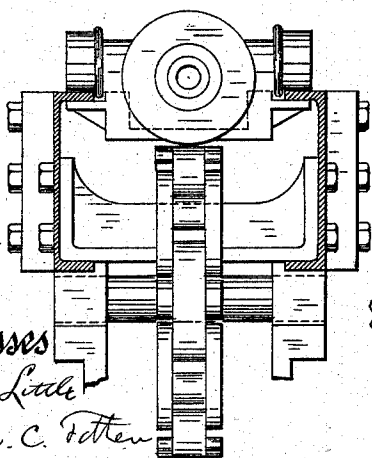


Fig. 7

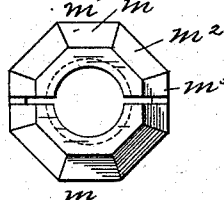


Fig. 9

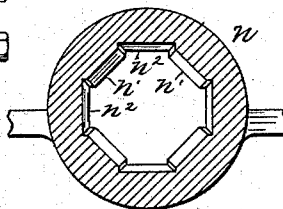
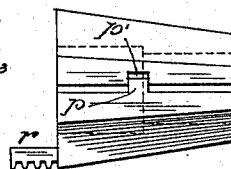


Fig. 8

Witnesses
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2 Sheets—Sheet 2.

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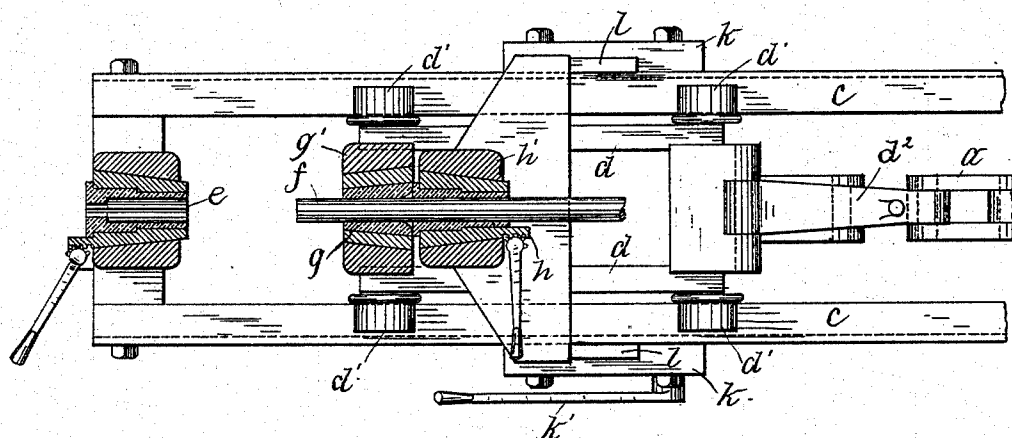


Fig. 3

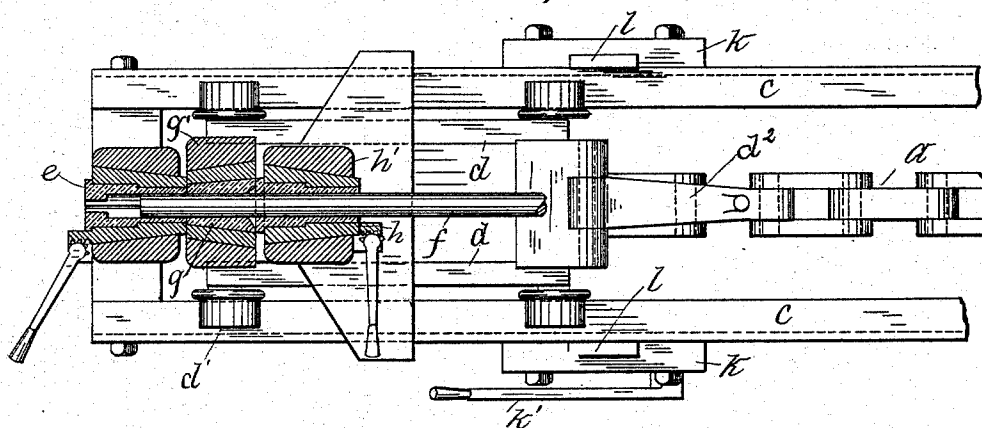


Fig. 4

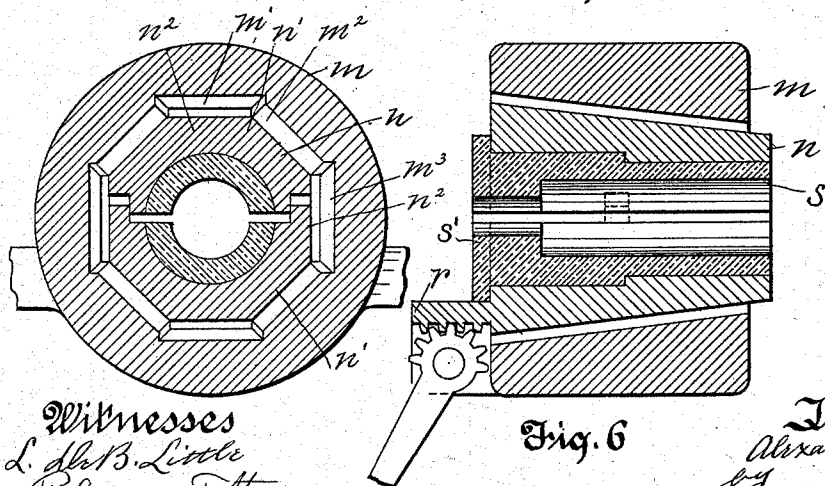


Fig. 6

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UNITED STATES PATENT OFFICE.

ALEXANDER W. FOSTER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE SINGER, NIMICK & COMPANY, LIMITED, OF SAME PLACE.

MACHINE FOR DRAWING METAL.

SPECIFICATION forming part of Letters Patent No. 527,486, dated October 16, 1894.

Application filed June 12, 1894. Serial No. 514,290. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER W. FOSTER, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Machines for Drawing Metals; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to machines for drawing rods, bars and tubes, its object being to provide a machine in which the rod can be handled in a comparatively small space, that is, in a space but little longer than its own length instead of requiring a space practically double the length of the rod; and in which the rod can be inserted in the drawing die so as to be grasped by the gripper without having its end previously reduced.

To these ends my invention comprises, generally stated, a draw-bench having a stationary gripper at one end thereof, supported directly on the draw-bench, a drawing-die traveling on the said draw-bench and a traveling gripper in line with the drawing die by which the rod can be grasped, and by movement between such gripper and drawing-die be forced through the drawing-die so as to be subsequently caught by the stationary gripper on the draw-bench and held while the drawing-die is drawn along the tube which is held from longitudinal movement.

It also consists in combining with the stationary gripper on the bench, a buggy having the drawing die secured thereto and the pushing gripper sliding on the buggy, and means for holding the pushing gripper from longitudinal movement so that the rod can be grasped by the pushing gripper and through the movement of the buggy the drawing die be drawn over the rod, while the pushing gripper is held stationary, and by the advancement of the buggy the rod can be carried into the stationary gripper and grasped thereby, and in the subsequent drawing operation the rod passed through both the pushing gripper and drawing die.

It also consists in certain other improvements as will be hereinafter described and claimed.

To enable others skilled in the art to make

and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view of the end of the bench carrying the fixed die, showing all the operative mechanism of the draw-bench, the part of the bench not shown being simply an extension of the track and the chain and its supporting sprocket, which it is not deemed necessary to illustrate. Fig. 2 is a plan view showing the dies and grippers in section, and showing the bar or rod held in the pushing gripper and just entering the drawing die. Fig. 3 is a like view showing the rod forced through the drawing die. Fig. 4 is a like view showing the rod carried forward and entered into the stationary gripper. Fig. 5 is an end view of the machine, and Figs. 6, 7, 8 and 9 are detail views of the gripping mechanism.

Like letters of reference indicate like parts in each of the views.

The draw-bench A may be of any suitable construction and has mounted therein the draw-chain *a* which is shown as passing around the sprocket *b* mounted in the draw-bench, it being understood that the chain is mounted on a like sprocket at the opposite end which is driven by any suitable power connections. The draw-bench has the track *c* extending for the full length thereof on which is mounted the buggy *d*, having the wheels *d'* traveling on the track *c* and also having the hook *d''* which can be inserted in the drawing chain *a* to give the necessary power for the operation hereinafter described and to draw the buggy along the track. At the forward end of the draw-bench is the stationary gripper *e* which is firmly secured to the draw-bench and is adapted to grasp or grip the rod *f* when inserted therein as hereinafter described. Secured upon the buggy *d* is the drawing-die *g* which fits in a die seat *g'* forming part of the buggy, it being, of course, understood that the dies are removable from the die seat, so that dies of different sizes may be inserted therein. Mounted to slide on the buggy *d* is the gripper frame *h'* which carries the pushing gripper *h*, the buggy being made of sufficient length to permit a longitudinal movement between the pushing gripper and drawing die

sufficient to force the rod to be drawn through the drawing die and beyond the same a sufficient distance to permit of the entrance of the end of the rod in the stationary gripper *e*.

5 The preferred construction of the grippers *e* and *h* will hereinafter be described. The gripper frame *h'* extends beyond the track *c* of the draw-bench, and secured to the draw-bench are the bearings *k* in which are
10 mounted the sliding bars or stops *l*, these bars being moved by the lever *k'* which is connected to the shaft *k²* which extends across the draw-bench and has arms *l'* fitting in recesses in the lower ends of the sliding bars *l*
15 so that by the movement of the lever *k'* the sliding bars may be raised above the top surface of the tracks *c* of the draw-bench and into the course of the gripper frame *h'* so that said gripper frame will be held stationary by
20 striking against said sliding bars or stops.

The operation of the machine in its general nature, as included in the above description, is as follows: The rod, bar or tube *f* to be drawn is placed upon the draw-bench and
25 its end inserted into the pushing gripper *h* when the same is opened, and is passed forward until its end reaches the drawing die *g*, when the gripper *h* is closed and grips or holds the rod. The movement of the drawing
30 chain is controlled by suitable mechanism so that it may be started and stopped as desired, and the operator with the lever *k'* raises the stops *l* into the course of the gripper frame *h'* and inserts the hook *d²* of
35 the buggy into the chain and starts the chain which acts to pull back the buggy, while the pushing gripper and its frame are held stationary by the stops *l*, and so forces or pushes the rod held by the gripper through the drawing
40 die *g* and causes it to project beyond the same as shown in Fig. 3. When the drawing die is drawn close to the gripper *h* the machine is stopped and the stops *l* are lowered out of the course of the gripper frame *h'*, and
45 the gripper *h* is opened so as to permit the free movement of the bar through the same. The buggy is then pushed forward so that the end of the rod enters the stationary gripper *e*, and that gripper is then closed so as to grip
50 the rod and hold it. The hook *d²* is then inserted in the drawing chain *a*, and the said chain started so that it draws back the drawing die along the rod *f* while it is held stationary by the stationary gripper *e*, the rod
55 being in this way held stationary while the drawing die travels along the rod, and this continues until the drawing operation is completed, and the drawing die drawn off the rod while it is held in the gripper. It is only nec-
60 essary then to open the stationary gripper and remove the rod, pass the buggy to the forward end of the machine and repeat the operation.

It will be seen in this operation that the rod
65 to be drawn is moved only a short distance longitudinally and may be carried to the

drawing frame laterally or from the side thereof and entered into the pushing gripper, and that it is only necessary for the machine to be of the length greater than the rod cor-
70 responding to the amount of longitudinal movement to be given to the rod before it is caught by the stationary gripper, this being of importance as it saves space in the factory and does away with the necessity of the occu-
75 pation of a long space at the end of the machine for the handling of the rod to be drawn.

The form of gripping device preferred to be used by me is as stated above, illustrated in
80 Figs. 6 to 9, and in several of the figures of the draw-bench. Where the gripper is formed of two gripping jaws having tapering cylindrical outer surfaces moving within a tapering cylindrical seat, difficulty is experienced
85 because such cylindrical faces of the jaws and the seat therefor will not conform perfectly with each other in different positions, and the seat will either bind upon the jaws in the center thereof, or at the outer ends so causing the
90 gripping action practically between two points of the gripping jaws instead of all around the jaw faces. For this reason it is found desirable to employ the gripping jaws with tapering flat faces connected by angles as shown in these
95 several figures, and provide the seat with like tapering faces, so that these faces both of the jaws and of the seat for the jaws can bear upon each other in such way as to maintain the
100 hold entirely around or for the greater part of the gripping faces of the jaws. The gripping jaws are shown at *m* and they fit in the jaw seat *n* on either the draw-bench or the gripping frame above referred to. It will be
105 noticed that the outer faces of the gripping jaws *m* are both inclined and composed of a series of flat faces connected by angles, there being the central flat faces *m¹*, the side flat faces *m²* and the end flat faces *m³*. The jaw
110 seat *n* has flat faces corresponding in incline or taper to the faces of the jaws, but having the projecting incline faces *n'* adapted to contact with the side faces *m²* of the jaws, while between such projecting inclined faces *n'* are the depressions *n²*, the result of which is that
115 when the jaws slide in the jaw seat their incline faces *n²* bear against the projecting inclined faces *n'*, while the remainder of the jaw faces are free on account of the depressions *n²* in the jaw seat. As the jaws slide in
120 the jaw seats and the relative positions of the inclines change with relation to each other as is necessary, the edges of the inclined faces *m²* of the jaws may pass beyond the projecting inclined faces *n'* into the depressions *n²* so that there is a bearing of straight or flat
125 inclined faces against each other and the pressure from the jaw seat to the jaws is always the same. When the rod is inserted in the jaws and the jaws are clamped between
130 the same, it will be evident that the clamping or gripping strain is sustained by the side inclined faces *m²* of the jaws, and the

projecting inclined faces n' of the jaw seat which prevents the spreading of the jaws under the strain and supports the outer edges of the jaws against such spreading action, 5 sustaining the pressure on the jaws at the two points at which the greatest strain is naturally brought upon the jaws, and sustaining the pressure of the jaw faces around the rod at practically all points and always in 10 the same lines, instead of having a variation in the points of support which would occur in the ordinary tapering cylindrical jaws and jaw seat.

The jaws m are connected together by the 15 projection p in one jaw fitting in the recess p' in the other which always holds them in proper line with each other, and they may be moved in the jaw seat in any way desired, for example, by means of a rack bar r extending out at the end of one of the jaws 20 which engages with a rack lever r' mounted on the gripper in any suitable way. The jaws are also illustrated as having the linings s which can be changed at pleasure according to the size of the rod or tube to be drawn 25 and replaced in case of wear.

The linings of the stationary grippers are shown with inwardly projecting-ribs s' which form stops to prevent the rod or bar from 30 passing through the gripper. The linings of the pushing gripper h are of practically the same diameter throughout so as to permit the passage of the rod through the same.

What I claim as my invention, and desire 35 to secure by Letters Patent, is—

1. The combination with a fixed gripper of a traveling drawing die, and a pushing gripper adapted to force the rod through the traveling drawing die, substantially as set forth.

40 2. The combination of a fixed gripper, a traveling drawing die, a pushing gripper and stop mechanism for holding such pushing gripper stationary during the movement of the drawing die, substantially as set forth.

45 3. The combination of a fixed gripper, a buggy carrying a traveling drawing die, a pushing gripper mounted to slide on the

buggy, and stop mechanism engaging with the pushing gripper, substantially as set forth.

4. The combination of a drawing frame having a buggy traveling thereon, a drawing die 50 carried by the buggy, a pushing gripper in line with the drawing die and stops on the bench adapted to engage with the pushing gripper, substantially as set forth. 55

5. The combination of a drawing bench, a drawing chain traveling therein, a buggy adapted to engage with the drawing chain and having a drawing die thereon, a pushing gripper mounted to slide on the buggy and vertically movable stops mounted on the drawing 60 bench and adapted to engage with the pushing gripper, substantially as set forth.

6. The combination of a drawing bench, a buggy traveling thereon, and carrying a drawing 65 die, a gripper frame sliding on the buggy and extending beyond the draw-bench and carrying a gripper in line with the drawing die, and vertically movable stops mounted in the draw-bench beyond the track thereof, and 70 adapted to engage with the gripper frame, substantially as set forth.

7. In a gripping die, the combination of a gripper or jaw seat having four or more flat tapering faces therein at angles to each other, 75 of two gripping jaws fitting in said seat, each having two or more flat tapering outer faces engaging with like faces in the jaw seat, substantially as set forth.

8. The combination of a gripper or jaw seat 80 having four or more flat tapering faces projecting inwardly therefrom, and recesses between said faces, of two gripping jaws fitting in said seat, each having two or more flat tapering outer faces adapted to engage with the 85 projecting faces of the gripper seat, substantially as set forth.

In testimony whereof I, the said ALEXANDER W. FOSTER, have hereunto set my hand.

ALEXANDER W. FOSTER.

Witnesses:

JAMES I. KAY,
ROBERT C. TOTTEN.