

C. H. MORGAN & F. H. DANIELS.
Guide for Wire-Rod Rolling-Mills.

No. 224,839.

Patented Feb. 24, 1880.

FIG. 1.

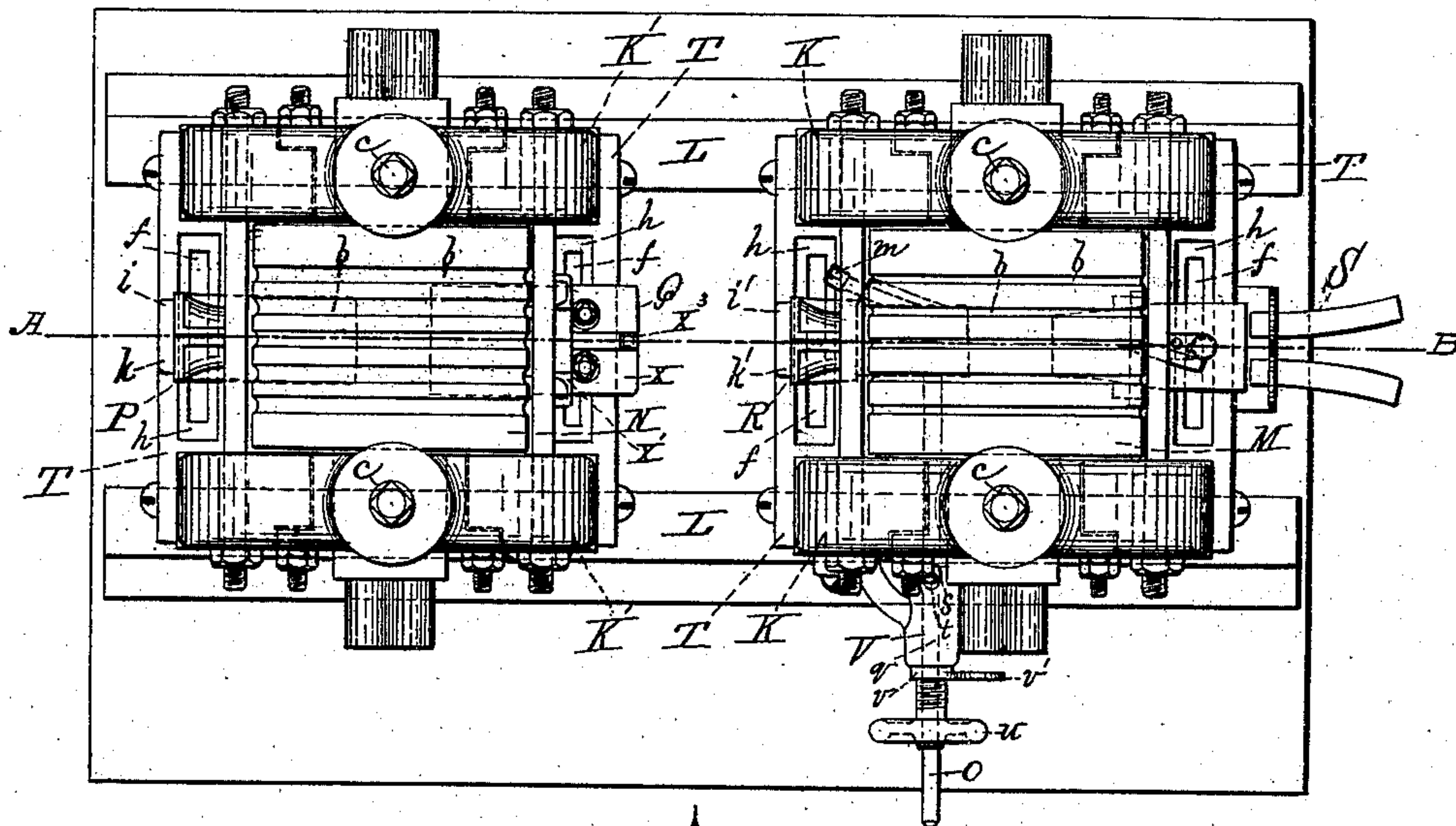
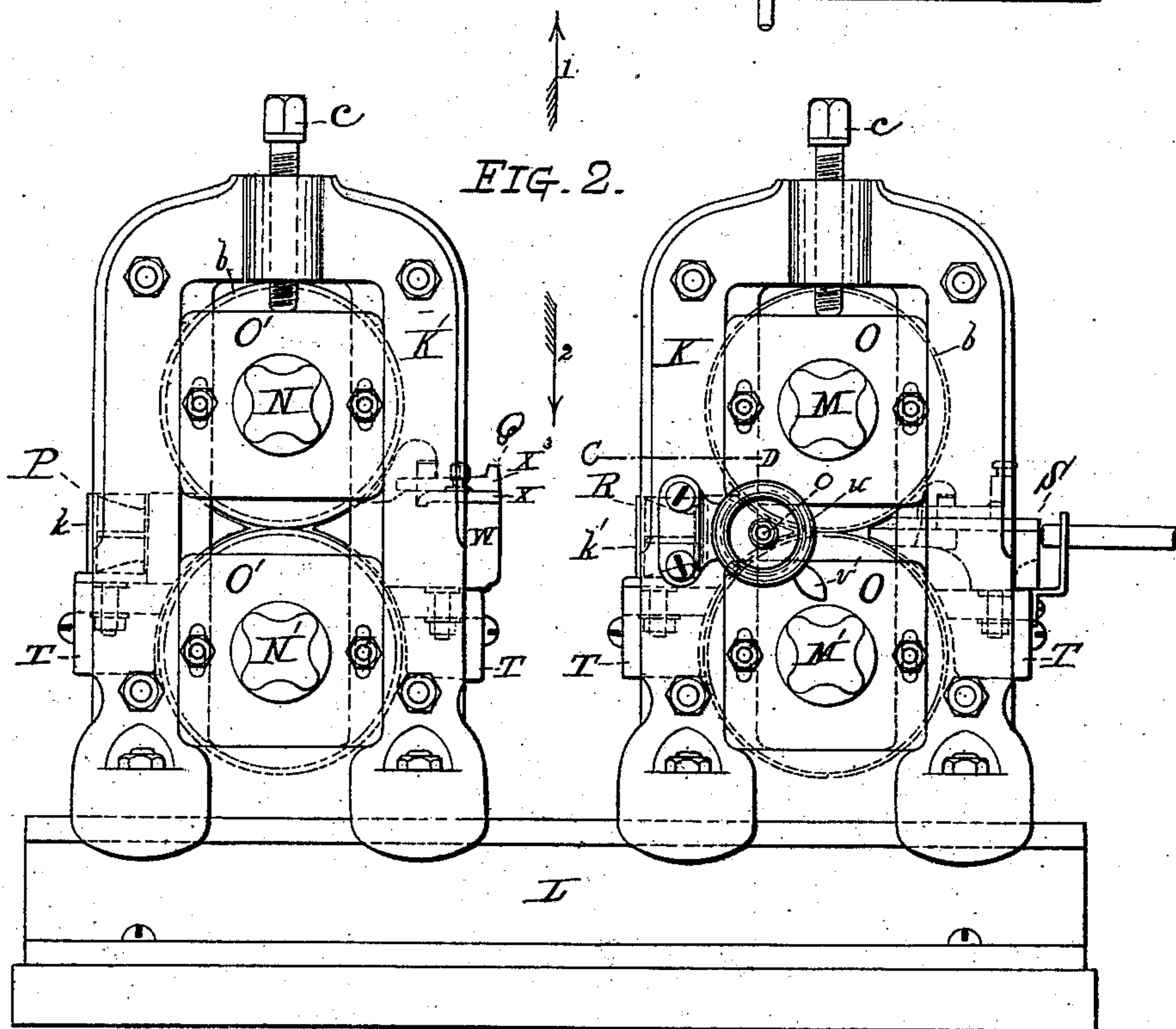


FIG. 2.



Witnesses=

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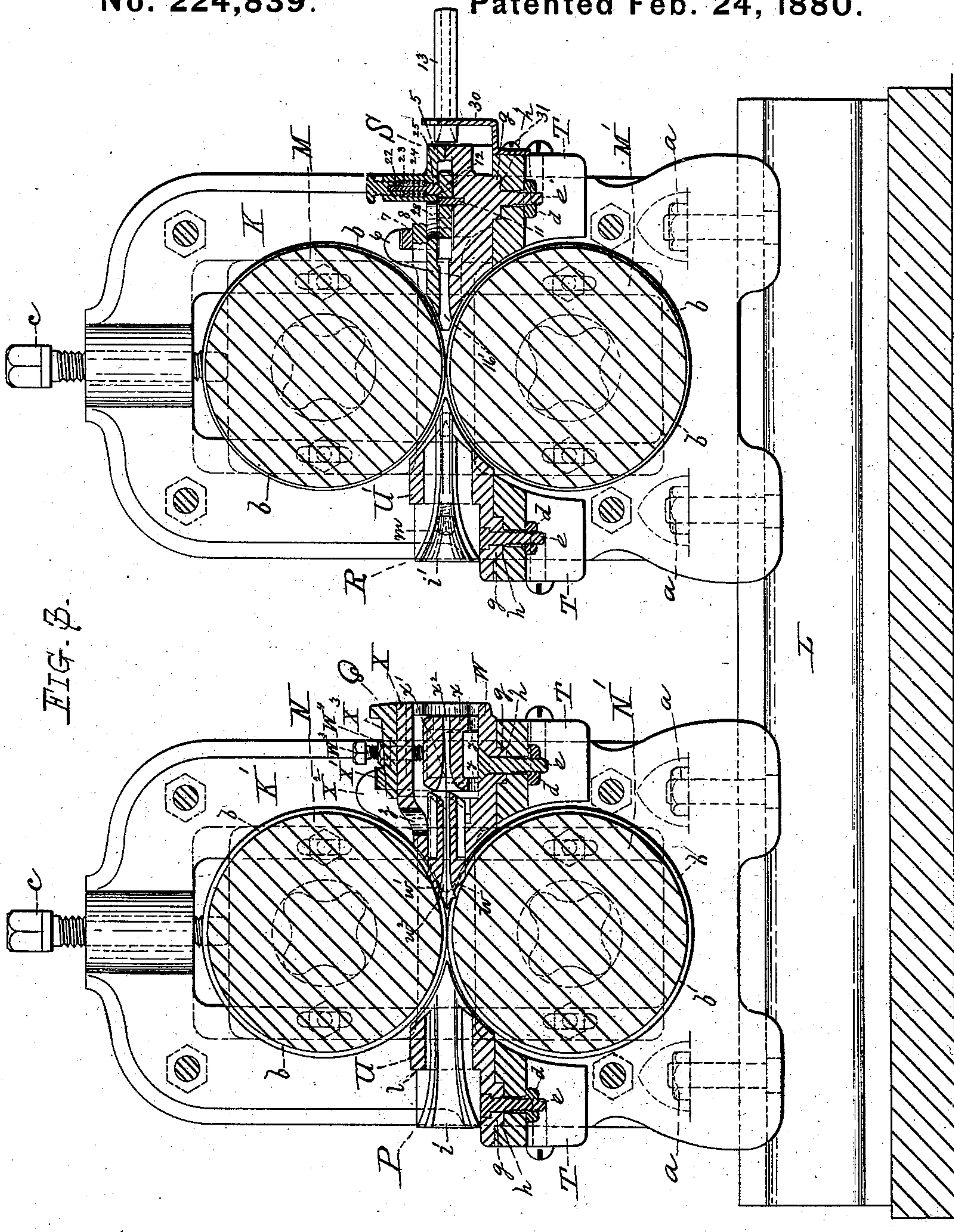


FIG. 1.

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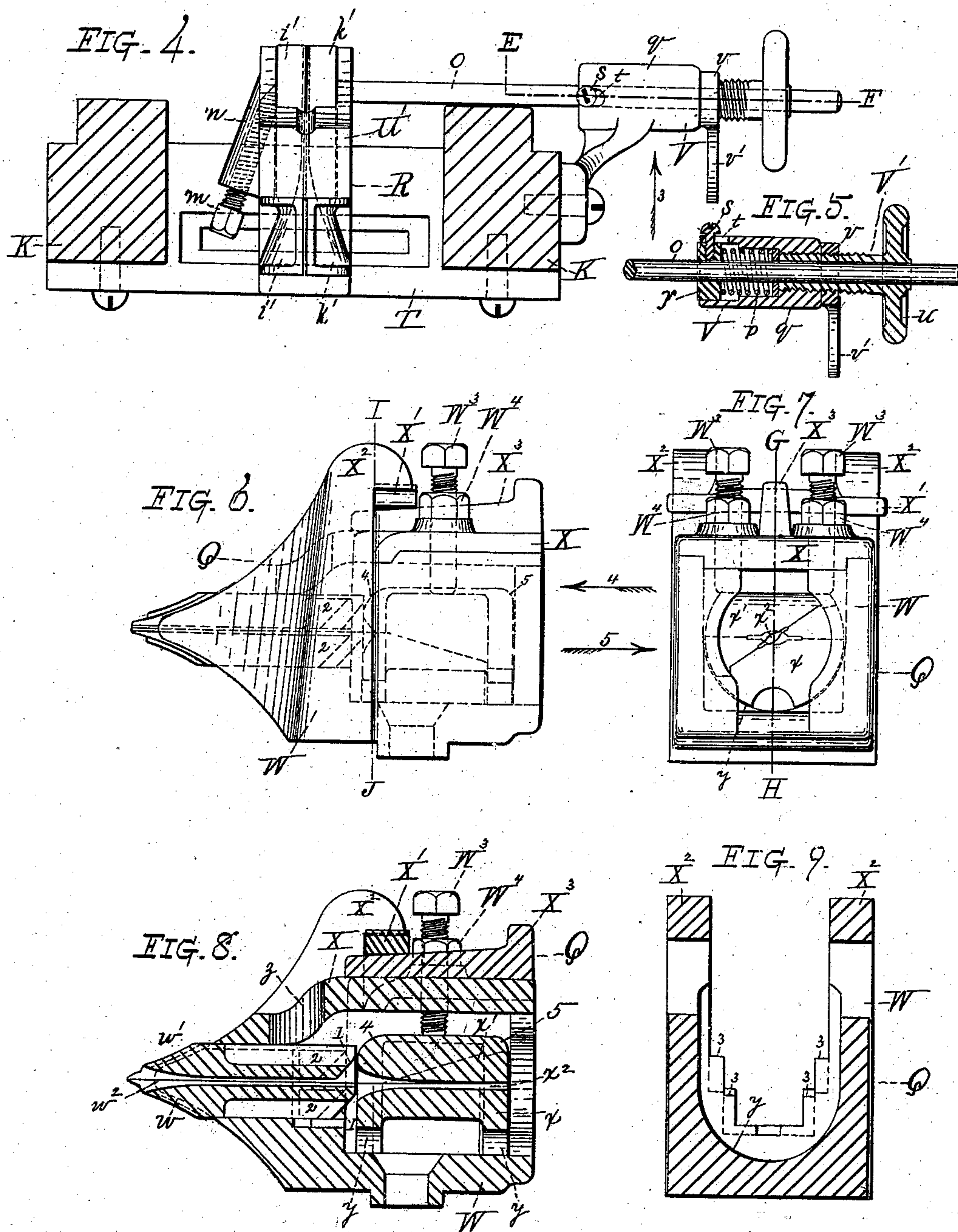
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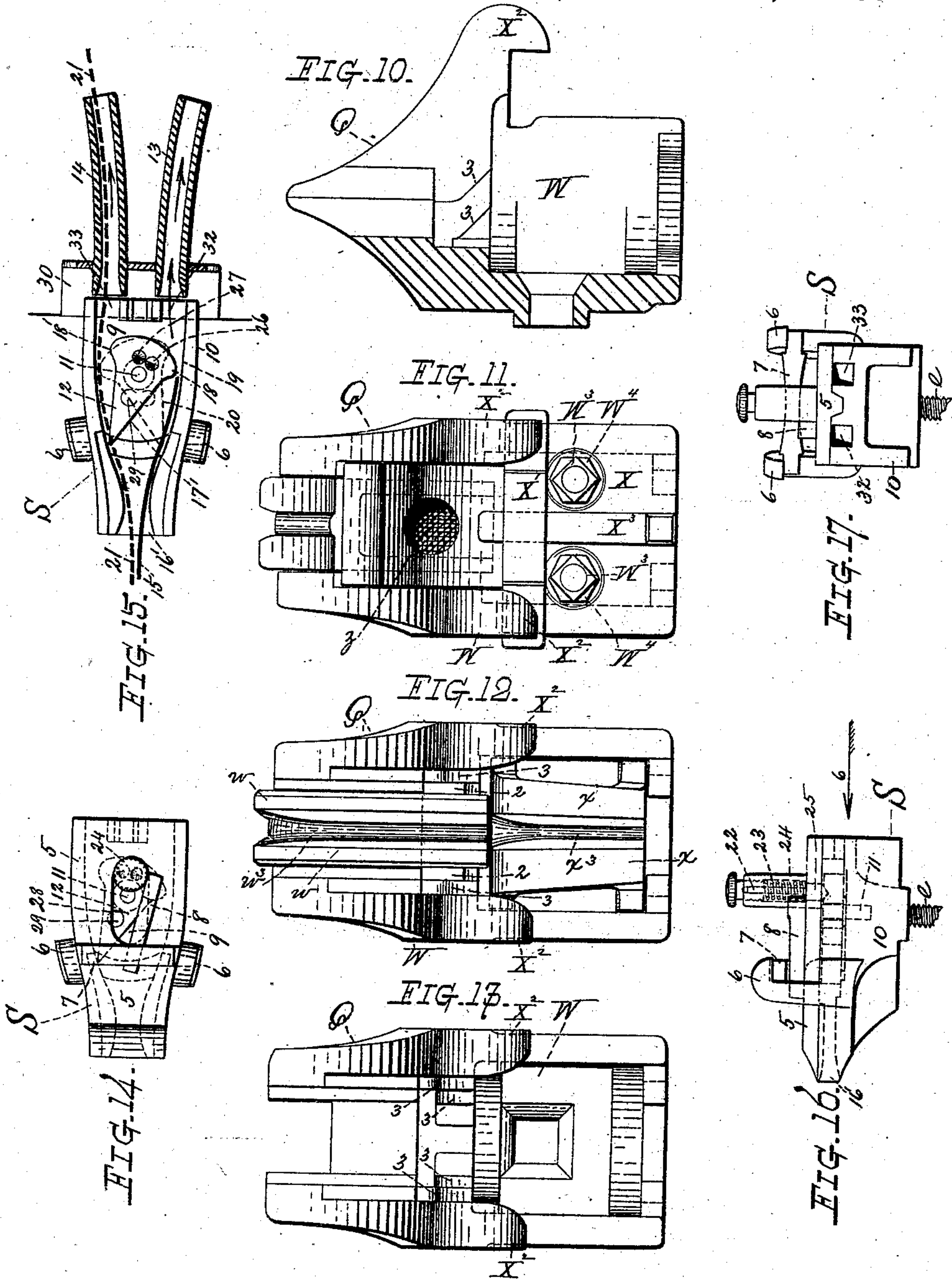
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UNITED STATES PATENT OFFICE.

CHARLES H. MORGAN AND FRED H. DANIELS, OF WORCESTER, MASS.; SAID DANIELS ASSIGNOR TO WASHBURN & MOEN MANUFACTURING COMPANY, OF SAME PLACE.

GUIDE FOR WIRE-ROD-ROLLING MILLS.

SPECIFICATION forming part of Letters Patent No. 224,839, dated February 24, 1880.

Application filed October 31, 1879.

To all whom it may concern:

Be it known that we, CHARLES H. MORGAN and FRED H. DANIELS, both of the city and county of Worcester, and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Guides for Continuous or other Wire-Rod-Rolling Mills; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents so much of a continuous wire-rod-rolling mill as is necessary to illustrate our aforesaid invention. Fig. 2 represents a side view of the parts shown in Fig. 1, looking in the direction indicated by arrow 1 of the same figure. Fig. 3 represents, upon an enlarged scale, a central vertical longitudinal section of the parts shown in Figs. 1 and 2, taken on line A B, Fig. 1, looking in the direction indicated by arrow 1 of said figure. All the succeeding figures are also represented upon an enlarged scale. Fig. 4 represents a horizontal section taken on line C D, Fig. 2, looking in the direction indicated by arrow 2 of said figure, showing a plan view of our improved guide for conducting the wire rod directly to the finishing-rolls, as will be hereinafter more fully described. Fig. 5 represents a horizontal section taken on line E F, Fig. 4, looking in the direction indicated by arrow 3 of the same figure. Fig. 6 represents a side view of our improved guide case or holder and improved guide employed in combination with all the series of rolls preceding the finishing-rolls. Fig. 7 represents an end view of the case or holder and guide shown in Fig. 6, looking in the direction indicated by arrow 4 of said figure. Fig. 8 represents a central vertical longitudinal section of the same case or holder and guide shown by Fig. 6, taken on line G H, Fig. 7, looking in the direction of arrow 5 of said figure. Figs. 9, 10, 11, 12, and 13 represent different views of the same case or holder and guide shown by Figs. 6, 7, and 8, which will be hereinafter more fully described; and Figs. 14, 15, 16, and 17 represent different views of our improved guiding device for directing the finished wire rod from the last set

or finishing-rolls of a rolling-mill to the reels upon which said wire rod is coiled, as will be hereinafter more fully described.

Our invention relates to improvements in guides and the cases or holders which retain them in position in continuous wire-rod-rolling mills, both for guiding the wire rod from one set of reducing-rolls to another, and also for automatically directing the finished rod alternately to the right or left hand reel, whereby the operation of wire-rod rolling and coiling is greatly facilitated and cheapened.

To enable those skilled in the art to which our invention belongs to make and use the same, we will proceed to describe it more in detail.

In the drawings, K K K' K' represent housings, which are arranged and secured upon suitable bed-plates L L. Said housings K K' may be adjusted laterally upon bed-plates L by turning nuts *a*.

The reducing-rolls M M' and N N', which are provided with grooves *b*, are arranged to turn in suitable bearings O O', which are fitted loosely, so as to slide up and down a short distance in housings K K', thereby allowing the upper reducing-rolls, M N, to rest upon the surface of the lower ones, M' N'. The pressure of the upper reducing-rolls upon the unfinished wire rod passing between said rolls and the lower ones may be regulated by means of adjusting-screws *c*, which are arranged to turn in the upper ends of housings K K'.

As the rolls, their bearings, and housings may be of ordinary construction, no further description in reference to the same is here necessary.

The guides P, Q, R, and S are supported and held in their proper relative positions so as to properly guide the wire rod forward in its different stages of completion upon angular supporting-pieces T, which are secured to the sides of housings K K'. Said guides may be adjusted laterally, so as to bring them in line with any of the sets of grooves *b*, by turning their holding-nuts *d* upon screws *e*, the supporting-pieces T being provided with slots *f* to allow of such adjustment.

To prevent the guides from turning when

only one holding-screw, *e*, and nut *d* are used, as in the present instance, their under sides are provided with flanges *g*, which fit in corresponding grooves *h*, formed in the upper sides of supporting-pieces T.

Guide P is of ordinary construction, consisting simply of two guide-parts, *i k*, properly formed inside for conducting the billet or unfinished rod to the reducing-rolls, and which are loosely fitted in their holding case or holder U, being held from moving forward by shoulders *l* coming against the side of case or holder U, which is secured to its angular supporting part T, as before stated.

Guide R, in itself considered, is constructed the same as guide P; but it is combined with devices of novel construction for giving to the forward end of the guide-plate *k'*, where the opening between the same and plate *i'* is the smallest, a slight springing or expanding motion, so that when a bunch or other defect in the unfinished rod comes in contact with it it will allow it to pass through, thus obviating the liabilities heretofore existing in this class of machines of the end of the rod buckling up and breaking out, while at the same time the passing rod will always be held and properly directed in the desired position to the grooves in the last set or finishing-rolls.

In order to allow of such adjustment as aforesaid, the guides *i'* and *k'* are fitted quite loosely in their case or holder U'.

The forward end of the guide *i'* is held in its proper relative position by means of an angularly-arranged adjusting-screw, *m*, which turns in a boss, *n*, formed upon case or holder U'. The forward end of adjusting-screw *m*, as will be seen by referring to Fig. 4, is made conical shape to fit the side of guide *i'*.

The pressure upon guide *k'* is produced by a spindle, *o*, which is pressed against said guide by a spiral spring, *p*, (see Fig. 5,) arranged in the hollow part *q* of a holding-piece, V, secured to the side of housing K, as is represented by Figs. 1, 2, and 4 of the drawings.

Spindle *o* receives its power from spring *p* by the latter bearing against a collar, *r*, secured to said spindle by means of a set-screw, *s*, which screw works and is held in a slot, *t*, formed in the shell of hollow part *q* of part V.

Spiral spring *p* may be contracted or expanded, so as to produce a greater or less pressure upon the side of guide *k'*, by turning a threaded sleeve, V', in or out of hollow part *q* by means of a turning-handle, *u*, secured upon its outer end. After having been so turned in or out it may then be locked in that position by turning check-nut *v* by handle *v'*, or otherwise, up against the end of hollow part *q*, as represented in the drawings.

Guide Q, with its receiving and twisting guides, being an improvement on a guide for which Letters Patent No. 220,033 of the United States were granted to Charles H. Morgan, September 30, A. D. 1879, serves two purposes—that of guiding the partially-finished rod from its reducing-rolls to the next

guide, R, or corresponding rolls and guides, and of turning or twisting said rod one-fourth of a revolution before entering the next set of rolls, as represented in Fig. 7 of the drawings.

The arrangement, construction, and operation of guide Q, with its receiving and twisting guides, are as follows:

Two receiving and twisting guides, *w w'* and *x x'*, are loosely arranged in case or holder W. Both sets of guides are grooved out upon their inner faces, as represented at *w³ x³*, Fig. 12, so that when placed together, as represented in section, Figs. 3 and 8, a straight horizontal oval-shaped hole or passage, *w²*, is formed between the receiving-guides *w w'* and a spiral oval-shaped passage, *x²*, between the twisting-guides *x x'*. The receiving and twisting guides are held in place by means of a top holding-plate, X, the forward end of which rests upon the receiving-guide *w'*, thereby holding the same in position, while set or adjusting screws *W³ W³* pass down through its rear portion and bear upon the twisting-guide *x'*. The top plate, X, is, in turn, held in position by means of a cast-metal safety-bar, X', the ends of which are arranged under projecting flanges *X² X²*, and is held in such position by a wedge, *X³*, driven in between the same and the top of top plate, X.

By the above-described arrangement it will be seen that all the movable parts are perfectly and securely held in position by means of bar X' against any ordinary pressure which may be produced upon the guides in rolling wire rods under ordinary circumstances; but when the rod is interrupted by means of a flaw and buckles up, the enlargement occasioned thereby causes the upper guide, *w'*, and possibly guide *x'*, to rise, carrying up the plate X and breaking the inexpensive guide-bar X', consequently causing no damage whatever to the more expensive parts of the mill.

In order that the upper guide, *w'*, or both *w* and *w'*, may yield to the aforesaid pressure and fly out, their rear ends are inclined upward at 1, as represented in Figs. 3 and 8, and each guide *w w'* is provided at each side with flanges or projections 2 2, which also incline upward, as represented by dotted lines in Figs. 6 and 8, and the parts 3 of the case-holder W, upon which they rest, are also inclined upward in the same manner, (see Figs. 10 and 13,) and this arrangement is for the purpose of insuring greater certainty of the elevation of the upper guides and the breaking of the safety-bar X' in case of accident or interruption of the wire rod, as hereinbefore explained.

To further facilitate the aforesaid operation, the corners 4 and 5 of the upper guide, *x'*, are also curved or rounded.

The guides *x x'* may be turned so as to give a greater or less angle to the opening *x²* between said guides (see Fig. 7) by loosening locking-nuts *W⁴ W⁴* and turning adjusting-screws *W³*, the under side of the lower guide, *x*, being curved and arranged to turn upon

curved surfaces $y y$, formed on case or holder W, thereby allowing such adjustment.

z is an opening or hole in plate X, through which water may be introduced for keeping the parts from becoming unduly heated.

The forward ends of the openings to all the guides, as will be observed by referring to the drawings, are made flaring or trumpet-shaped, for the purpose of insuring the catching and proper passage of the unfinished rod into the same.

As the partially-finished rod passes forward from between the reducing-rolls N N', which in this instance we will suppose to have been rolled into an oval form in cross-section, it first enters and passes flatwise through the opening w^2 , between guides $w w'$, which are also oval-shaped, as before stated; thence on, also flatwise, into the opening x^2 , between guides $x x'$, and as it passes through is twisted or turned by the spiral form of the opening, as before described, and comes out at the opposite end of the opening x^2 at an angle, as represented by Fig. 7 of the drawings; and in its passage on it continues to turn, so that when it enters the trumpet-shaped mouth of the guides v' and k' it has been turned nearly one-fourth of a revolution, and, striking the sides forming said opening, is still farther turned into a perpendicular position, thus preparing it to enter the next set of reducing-rolls, which, in this instance, are represented as reducing it to the form of a finished rod.

Although but two sets of reducing-rolls are represented in the drawings, those being the last two sets, it will be understood that in practice from fourteen to sixteen sets of rolls are usually employed for reducing a billet to the size of a finished wire rod. The billet, which is about one inch square, is first introduced, while in a red-hot state, between the first set of reducing-rolls, which roll it into an oval form, and by the operation also reducing its size. It then passes forward to the next reducing-rolls, being guided and twisted, as before explained, when it is then rolled into a square form again and proportionately reduced, and so on from each succeeding set of reducing-rolls to the next until it is reduced to the size of a finished wire rod, as above stated, after which it is automatically guided to the reels by a guiding device hereinafter described.

In practice we propose to employ two reels, and so arrange and construct said reels that they may be operated alternately, as occasion may require, whereby no time is lost, as the operations of coiling the finished wire rod upon one of the reels and removing the one previously coiled may be performed at one and the same time, or both operations be carried on simultaneously.

Guide S is provided with a cover or safety cap-piece, 5, ears or projections 6 6, breaking-bar 7, and wedge 8, similar to guide Q, and for operation substantially in the same manner.

In the space or chamber 9, formed between the lower part, 10, and cover or cap-piece 5 of guide S, is arranged to turn upon a pin, 11, secured in said lower part, 10, a switch or guiding-piece, 12, the function of which is to change the course of the wire rod from one side to the other, so that it will pass alternately through conducting-pipes 13 and 14.

Supposing the switch or guiding-piece 12 to be in the position represented by full lines, Fig. 15, the wire rod 15', (shown by full lines,) as it passes in at the mouth 16' of the guide, strikes the side 17' of switch 12, and, glancing from its surface, is guided thereby between the rounded corner 18 of the switch and the side 19 of the guide box or case, and consequently is guided or directed into and through pipe 13. As the last end of the finished wire rod is drawn through it strikes upon and draws the rounded corner 18 of the switch 12 forward, so that the switch is swung or switched over to the opposite side and into the position represented by dotted lines 20, whereby, when the end of the next rod, 21, (shown by dotted lines,) is run through, it passes upon the opposite side, and is guided into and through pipe 14, its last end reversing the switch by its action on the rounded corner 18' on that side, as before stated, and so on, each succeeding rod which is fed forward and through reversing and setting the switch for the next rod.

Pipes 13 and 14 may be made with their mouths flaring and of any desired length for conducting the rods to the reels.

In order that switch 12 may not prematurely swing back after each reversing operation, a spindle, 22, is combined with cover or cap 5, and so arranged that its point will press upon the top of the rear end of the switch, and which result is attained by means of a spiral spring, 23, arranged in the hollow part 24, secured to cover or cap 5. The lower end of spindle 22 is provided with a head, 25, against which spring 23 bears, and the lower end of said head is made conical and its point rests in one or the other of two depressions, 26 or 27, formed in the top of the switch, according to which way said switch is turned. By this arrangement it will be seen that the switch is prevented from prematurely or accidentally swinging back when reversed, while at the same time it is easily turned by the pressure and friction of the last end of the finished wire rod as it passes around either of the corners 18 or 18'.

Opening 28 in cover 5 and hole 29 in switch 12 are for the purpose of allowing the switch to be reversed by hand when desired.

Guide-pipes 13 and 14 are secured upon an adjustable holding-plate, 30, which is secured to its angular part T by means of screws 31. (See Fig. 3.)

Said plate 30 may be adjusted laterally, so as to bring the pipes 13 and 14 in line with the openings 32 and 33 in guide S, by slots being formed in said plate where screws 31 pass through the same.

In practice the switch 12 may be arranged in a vertical position instead of in a horizontal one, as represented in the drawings, in which case the pipes 13 and 14 would be arranged one over the other at their connection with guide 5, but afterward curved or bent and arranged to conduct the finished rod to the reels, arranged side by side, the same as when the parts are constructed and arranged as shown in the drawings.

As the depressions 26 and 27 are made in conical form, as soon as the point of the head 25 of spindle 22 enters the side of either of said concavities the action of spring 23 has a tendency to assist in reversing switch 12 by the action of the point of head 25 against the side of such concavity.

If preferred or found desirable, the point of switch 12 may be rounded, and it may also be provided with a small friction-roll, so that in case its narrow point should bear against the rod in its passage through guide S to either of the tubes 13 and 14 there would be no catching or breaking of the rod.

Having described our improved rolling-mill,

what we claim therein as new and of our invention, and desire to secure by Letters Patent, is—

1. The combination, with the top plate, X, and projecting flanges X² X², of safety-bar X' and wedge X³, substantially as and for the purposes set forth.

2. The combination, with the guides i' k', of the adjusting spring-rod o and adjusting-screw m, substantially as and for the purposes set forth.

3. The combination, with guide k', of rod o, spring p, screw V', and set screw or nut v, substantially as and for the purposes set forth.

4. The combination, with the parts 5 and 9, of switch 12, spindle 22, and spring 23, substantially as and for the purposes set forth.

5. The combination, with the parts 9 and 5, of switch 12 and guiding-tubes 13 and 14, substantially as and for the purposes set forth.

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Witnesses:

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