

(No Model.)

4 Sheets—Sheet 1.

A. HUGHES.

ROLLING MILL FOR ROLLING WIRE AND RODS.

No. 252,467.

Patented Jan. 17, 1882.

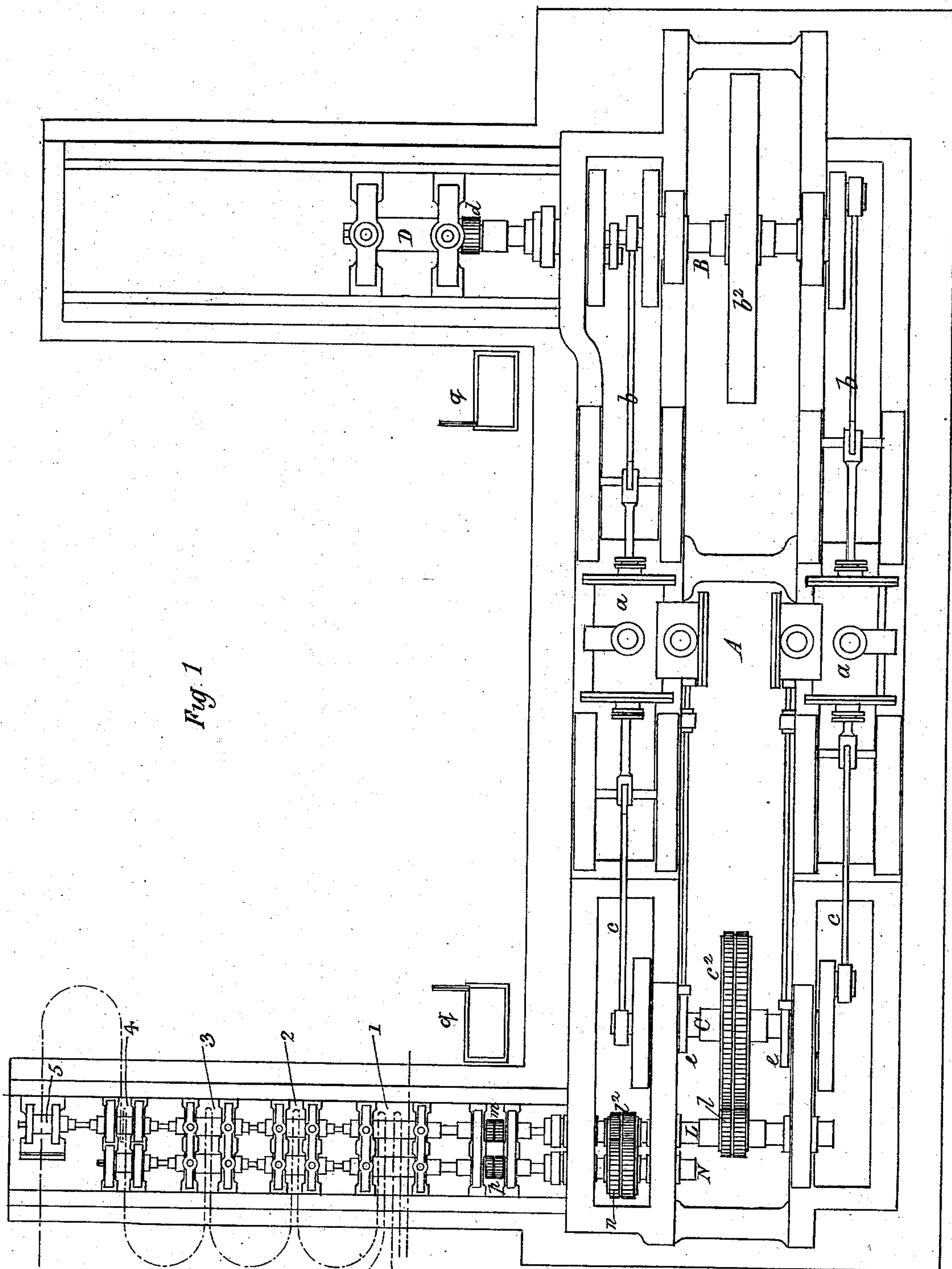


Fig. 1

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L. M. Hopkins

Inventor: Alfred Hughes
By Knight Bros

(No Model.)

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Fig. 3

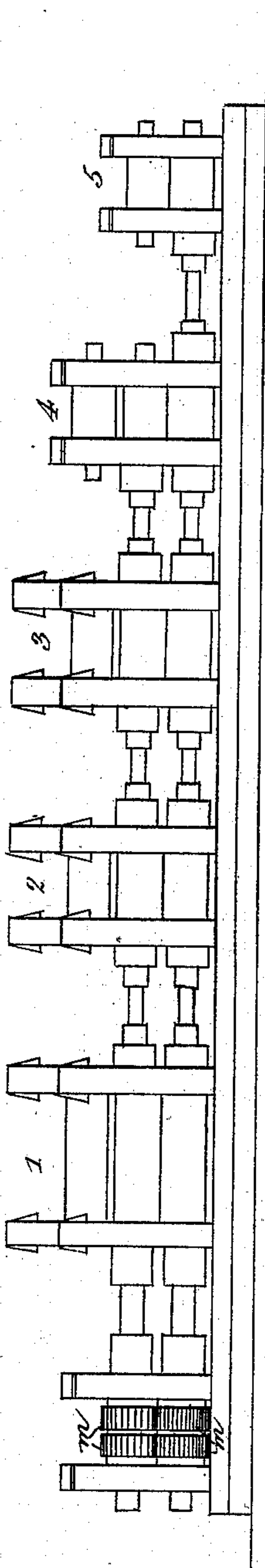


Fig. 2

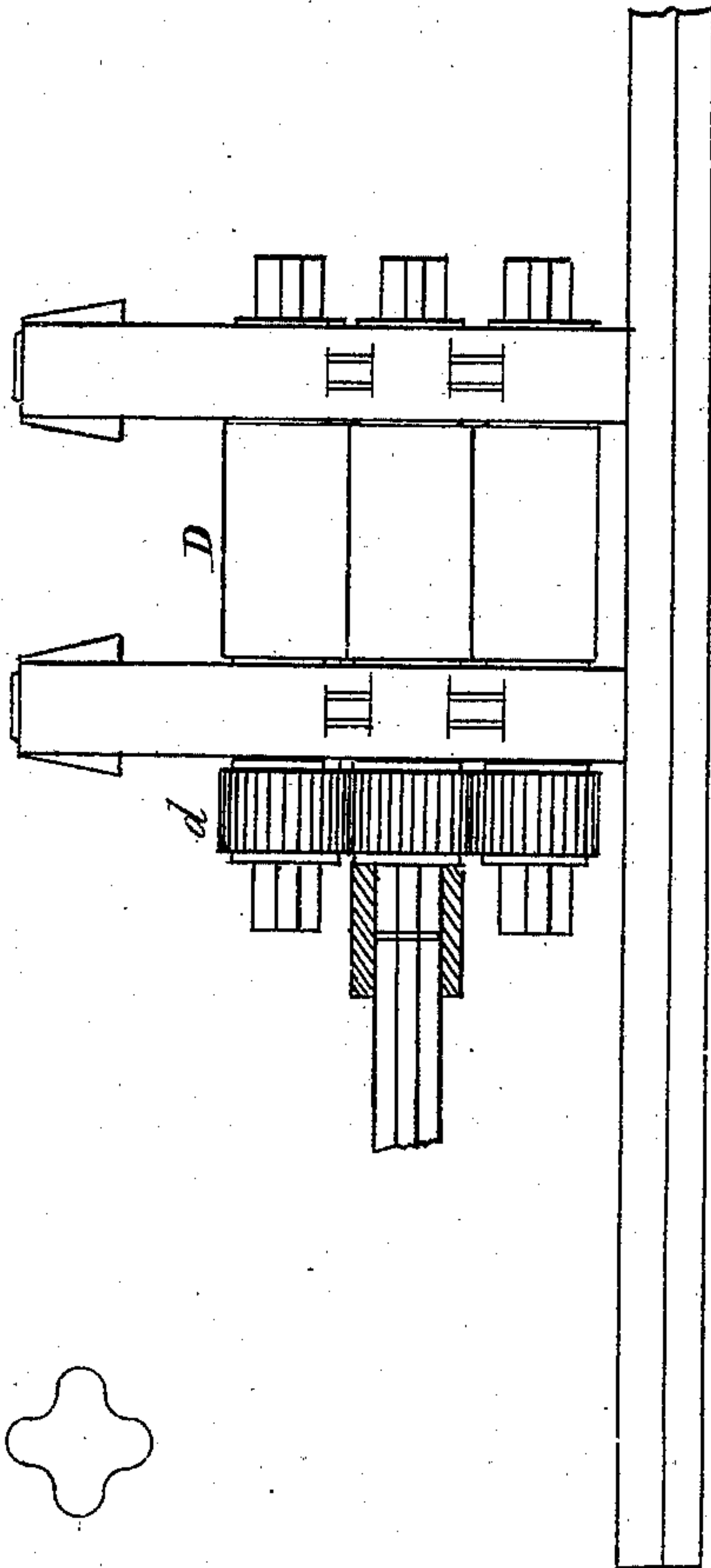
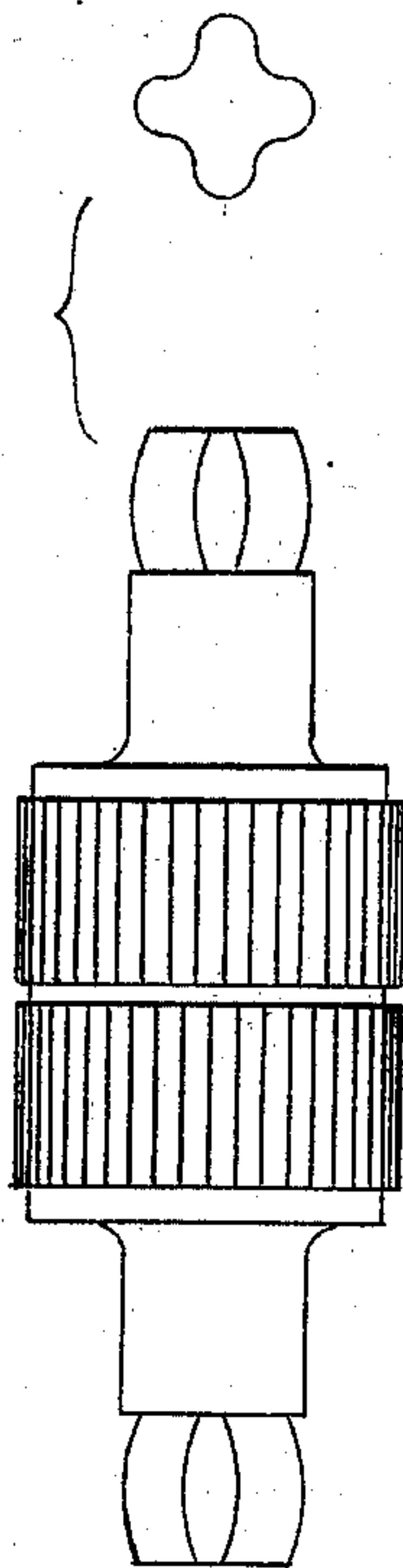


Fig. 8.



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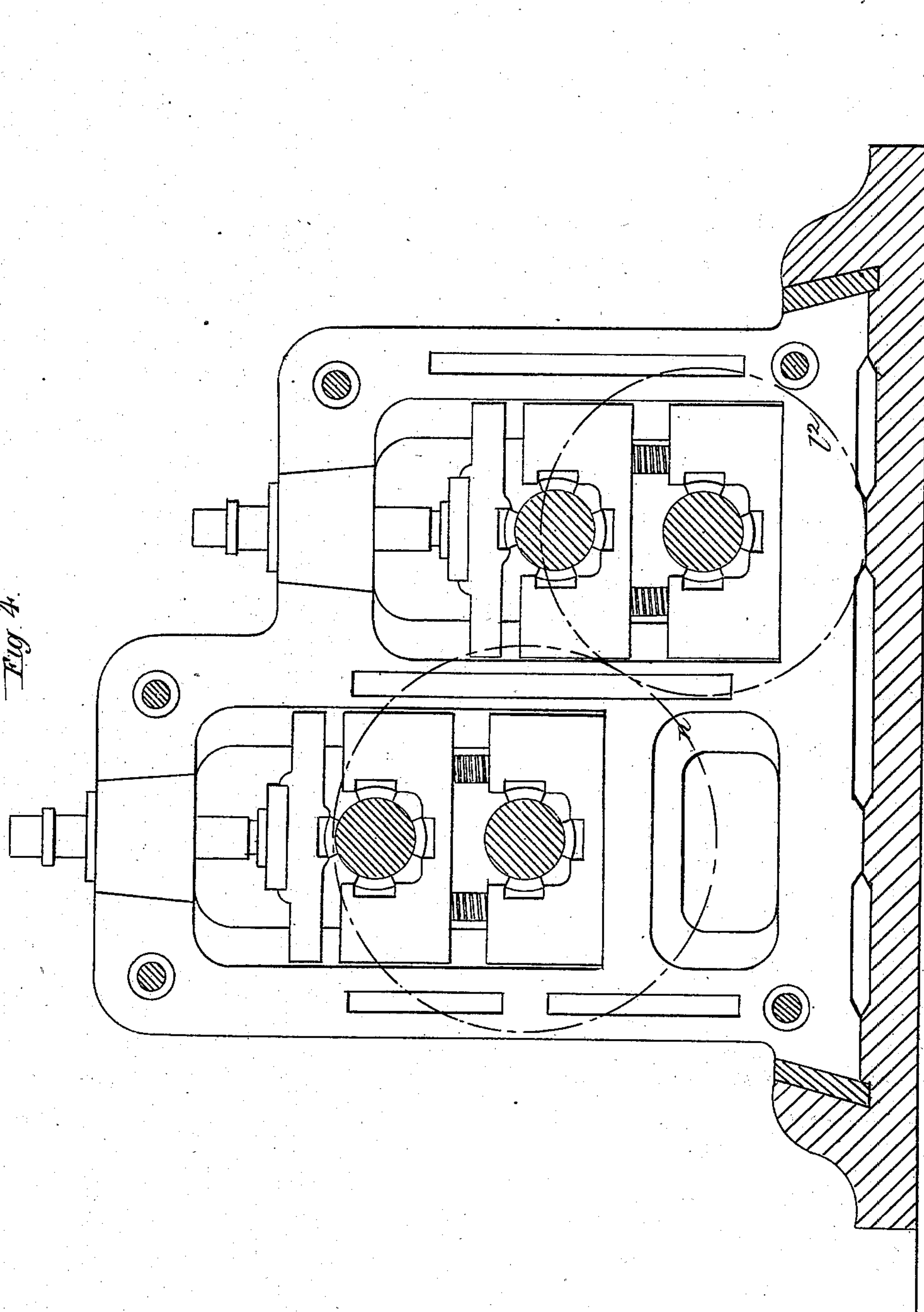
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Fig. 4.



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(No Model.)

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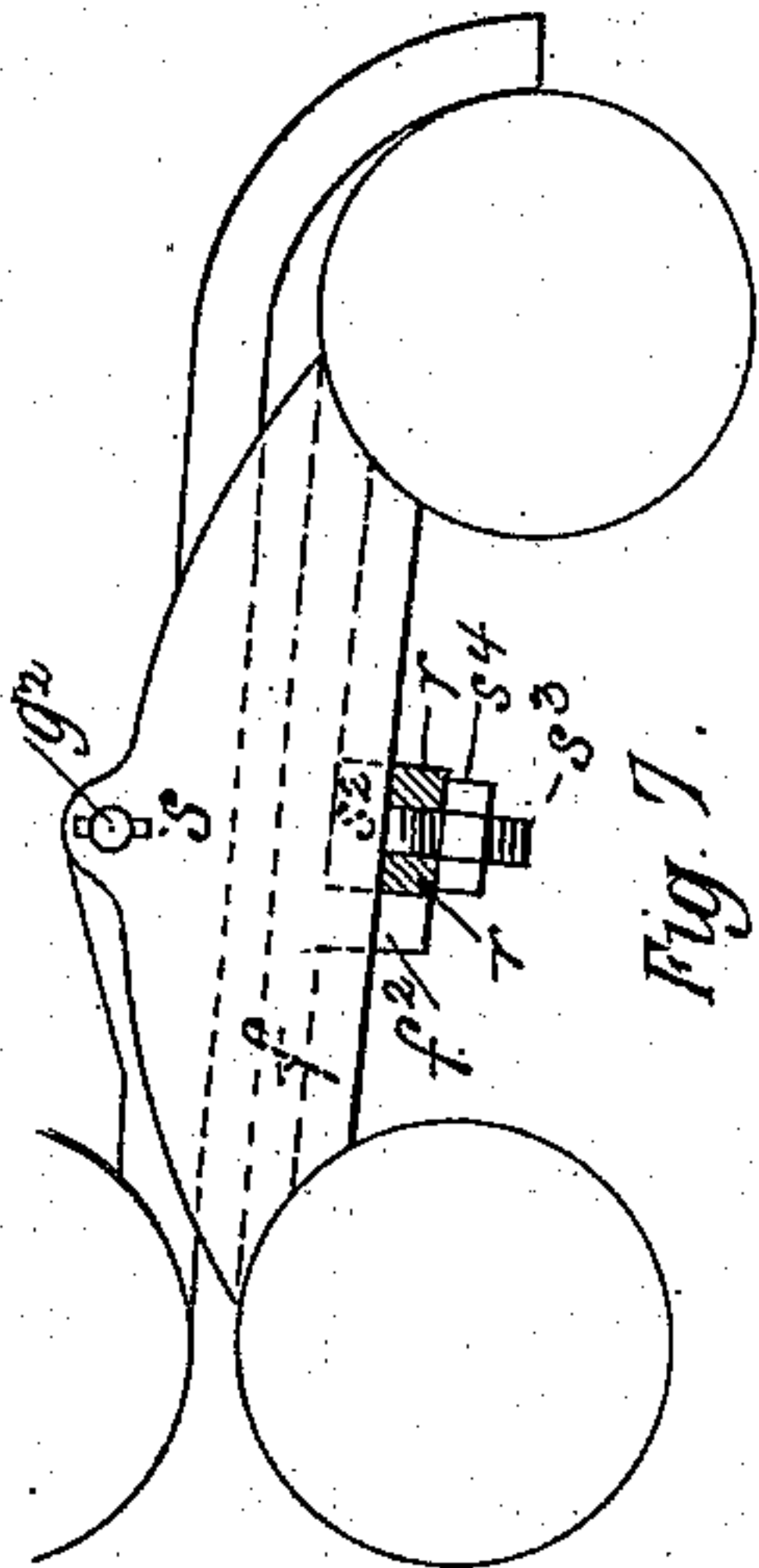


Fig. 5.

Fig. 7.

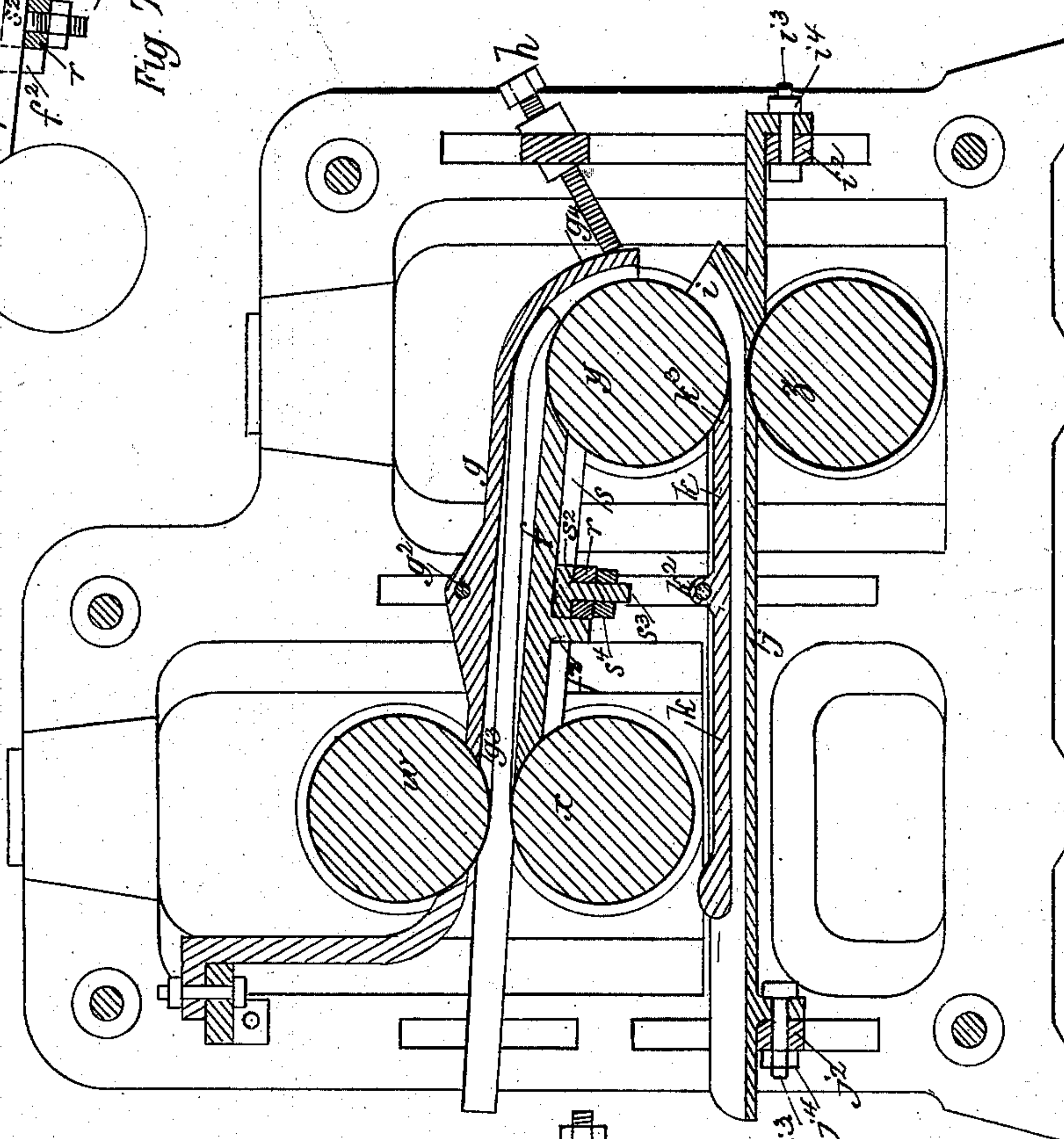
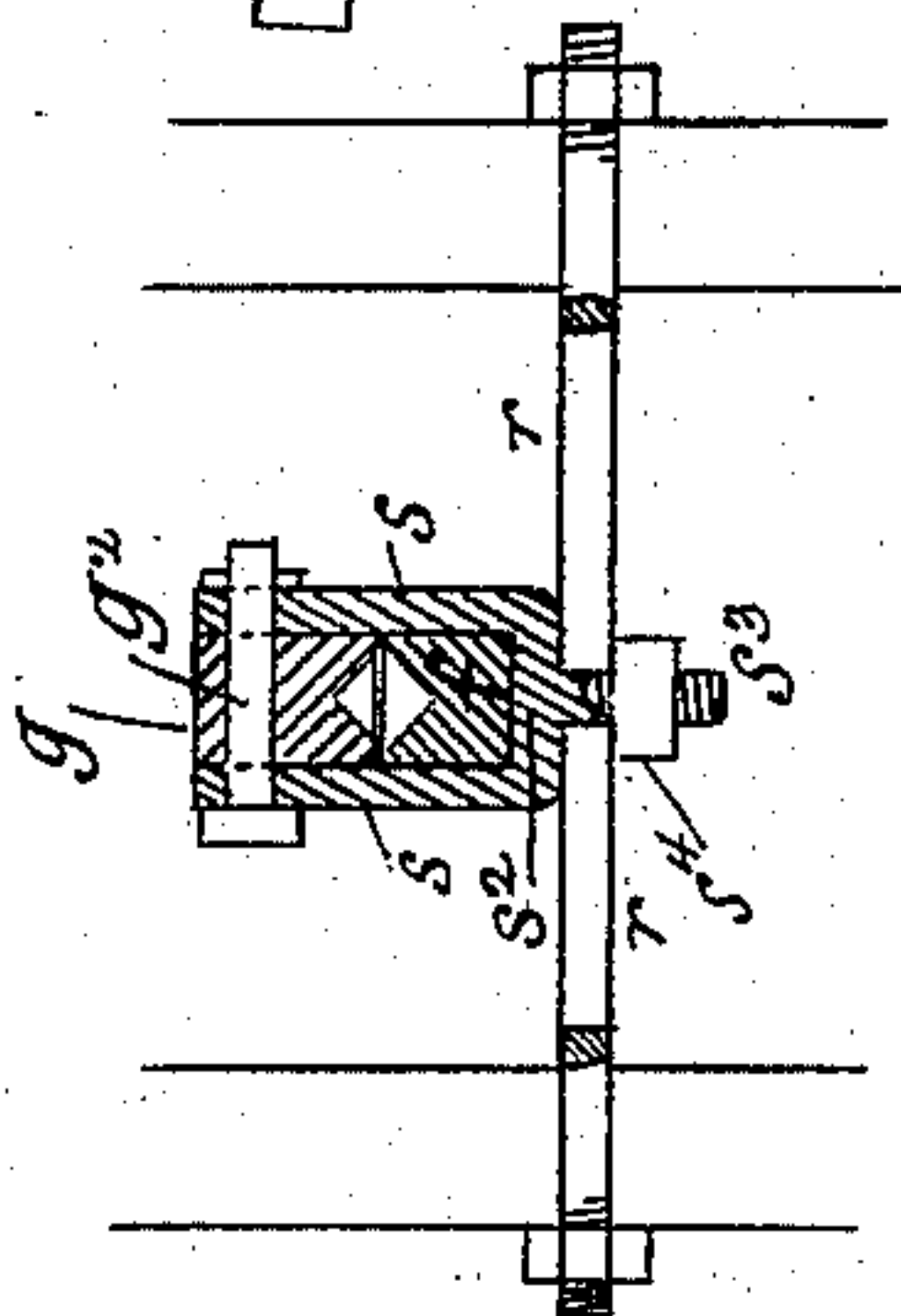


Fig. 6.



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UNITED STATES PATENT OFFICE.

ALFRED HUGHES, OF GLASGOW, SCOTLAND.

ROLLING-MILL FOR ROLLING WIRE AND RODS.

SPECIFICATION forming part of Letters Patent No. 252,467, dated January 17, 1882.

Application filed March 17, 1881. (No model.) Patented in England January 27, 1881.

To all whom it may concern:

Be it known that I, ALFRED HUGHES, of Glasgow, in the county of Lanark, North Britain, wire-roller, have invented Improvements in Rolling Metal Wires, Rods, and the Like, and in Machinery to be Employed Therein, (for which I have applied for Letters Patent of the United Kingdom of Great Britain and Ireland, No. 358, by petition, to bear date the 27th day of January, 1881,) of which the following is a specification.

My said invention relates to improvements in rolling metal wires, rods, and the like, and in machinery to be employed therein, and has for its object to so arrange and combine the rolls and other parts together that a compound machine is produced, wherein the rolling can be effected continuously from the bloom to the finished article, and a great saving of manual labor is effected, the process conducted more rapidly than hitherto, and reheating between the various operations dispensed with.

Figure 1 of the accompanying drawings represents, in plan, machinery or apparatus arranged and combined according to my invention.

A motive-power engine, A, of any suitable or convenient construction, is provided, its cylinders *a* having pistons with double piston-rods *b c* projecting from both covers of the cylinders, the said rods giving rotary motion to two shafts, B and C, respectively, at either end or side of the machine. *e* are the eccentrics for actuating the slide-valves of the cylinders. The shaft B carries a fly-wheel, *b*², and through gearing *d* drives the rolls D of the "breaking-down train," which are the rolls by which the bloom is first acted upon after leaving the furnace. These rolls are shown in front elevation separately and drawn to a larger scale in Fig. 2. The other shaft, C, through gearing drives a series of rolls arranged opposite the first-mentioned rolls D, and placed in double pairs, side by side, in the relative position shown in plan in Fig. 1, and in side elevation, drawn to a larger scale, in Fig. 3, and numbered 1, 2, 3, and 4, the finishing-rolls being marked 5. Fig. 4 is a transverse section, taken between sets of these rolls, and Fig. 5 is a transverse section taken through a set of the same, both figures being drawn to a larger scale, and taken from the point of

view indicated by the arrow in Fig. 1. The said series of rolls constitute the "wire-mill" or rolls by which the "billet" or rod, after it leaves the rolls D, is continuously acted upon to produce the wire or finished article, the reducing-grooves in the said series of rolls gradually lessening from the first groove in the first set of rolls, 1, to the finishing-rolls 5, being preferably such as to give alternately square and oval forms to the rod or bar acted upon until the last pair of rolls is reached, which will, of course, have grooves of the requisite shape for finishing the wire, rod, or other article. The bar being rolled, after it has passed through one pair of each double pair of rolls is automatically fed back through the other pair of each double pair of rolls by guiding appliances provided at each groove in each double pair of rolls. In Fig. 5 this guiding appliance is illustrated in vertical section. It consists at bottom of a fixed bed or table, *f*, level with the groove at the upper surface of the lower roll, *x*, of the first pair of rolls and with the groove at the upper surface of the upper roll, *y*, of the other pair of rolls, the said table *f* extending from roll to roll, as shown. Above this table *f* is a hinged or pivoted guide-piece, *g*, centered at *g*², (to any suitable projection from a convenient part of the framing,) and forming a lever of the first order, the one end at *g*³ bearing against the upper roll, *w*, of the one pair of rolls, about level with the groove at the under part thereof, by the weight of the other end at *g*⁴, which is curved over and partly around the upper roll, *y*, of the second pair of rolls, from which it is kept from rising too far by a screw, *h*, capable of adjustment.

The table *f* and upper part, *g*, are shown in transverse section in Fig. 6 and in side elevation in Fig. 7, whereby it will be seen that the two parts together form between them a passage of the requisite shape to receive the rod as it issues from the groove of the rolls, which shape is or may be a shape corresponding to the groove of the roll in conjunction with which the guiding appliance is used. At the opening of the guide-piece *g* at *g*⁴ is another curved guide-piece, *i*, level with the groove at the top of the lower roll, *z*, of the second pair of rolls, and a table, *j*, at the other side of the roll, is at the same level to receive the rod or bar as it issues from the second pair of rolls, the said

rod or bar being directed in its course from above by a counterweighted lever, k , centered at k^2 , whose one end, k^3 , bears against the underside of the roll y , about level with the groove therein. This table j and lever k may together form a guide of the shape of the rod as it leaves the grooves of the rolls y z .

As before stated, the guiding appliances may be affixed to or carried by any convenient part of the framing. In the arrangement of the upper guide shown in the drawings a slotted bar or carrier, r , extends from housing to housing, and is adjustable vertically in slots in the said housing and fixed in position by nuts, as shown in Fig. 6, or by set-screws or wedges, or otherwise. A box consisting of two side plates, s , connected by the transverse piece s^2 , having a pin, s^3 , formed thereon, is carried by the bar r , the pin s^3 being passed through the slot in the said bar and fixed by a nut, s^4 , in the horizontal position to which the box has been adjusted on the bar r . The table f is supported in this box, resting upon the bottom s^2 thereof, a projection, f^2 , keeping the said table f in place. The pin g^2 , which forms the center for the lever g , is carried by the sides s of the box, as shown in Figs. 6 and 7.

The guides i and j are shown as being carried by rods i^2 and j^2 , adjustable vertically in slots in the housings, as described with regard to the upper guide, the transverse adjustment being obtained by the bolts i^3 and j^3 being shifted to one side or the other and fixed in position by the nuts i^4 and j^4 .

The pin k^2 , on which the lever k turns, may be carried by the cheeks or side plates of the guide or table j , or it may be a bar extending from housing to housing and adjustable and fixable in slots therein, as before described with regard to the other guides, and the box for the screw h may be carried in a similar manner; but it is to be understood that I do not limit myself to the precise arrangements hereinbefore described for carrying and adjusting these guiding appliances.

The rolls of the various sets are preferably arranged as shown in Figs. 1 and 3, so that each pair of the double pairs of rolls 1 2 3 4 are all in double line and upon two axes, one for all the corresponding rolls of each pair. At the end of the series and upon an axis common to one row of the other rolls is the pair of rolls 5, for giving the final form to the wire, rod, or the like.

The rolls of the wire-mill are driven by a driving-wheel, c^2 , on the shaft C, gearing with a pinion, l , on the shaft L, which forms an axis common to all the lower rolls of the one pair of rolls of each double pair, the upper rolls being driven by gearing-pinions at m . The rotation of the rolls of the other pair of each double pair of rolls is obtained from the pinion l^2 (see also Fig. 4) upon the shaft L, gearing into the pinion n on the shaft N, which forms an axis common to all the lower rolls of the pairs of rolls driven thereby, the upper rolls of such pairs

being driven by pinions, as at p , corresponding to those at m .

The pinions and driving-wheels are preferably formed with two concentric rings of teeth, 70 the teeth of which rings break bond with each other.

Fig. 8 represents one of the pinions m or p . Its ends are preferably of the clutch-like shape shown also in end view in this figure, engaging 75 in similarly-formed boxes in the shaft, to which they are thereby attached, so as to give rotation thereto.

In rolling metal wires, rods, bars, or the like the bloom from the furnace is passed through 80 the rolls D at the one side of the machine a number of times necessary to reduce it to a convenient size for treatment in the wire-mills or rolls at the opposite side of the machine, and issues from the said rolls D in the 85 form of a billet, which, after its ends have been sheared off, is passed through the first grooves in the first or upper pair of rolls of the double pair 1 of the series at the opposite side of the machine, then back through the next grooves, 90 and is then automatically passed by a curved guide, like that hereinbefore described, between the next grooves, which are on the other or lower pair of rolls of this double pair. Then between the next grooves, which are on the 95 first-mentioned pair of rolls, and thence by a curved guide, like that hereinbefore referred to, between the other grooves which are on the second pair of rolls. The rod or bar or the like is then passed in through the next two grooves, 100 which are in the next double pair of rolls 2, and thence through the remaining grooves, of which there may be five—viz., two each in two double pairs of rolls (3 and 4 in the drawings) and the last in the pair of finishing-rolls 5. 105

Curved guides, such as are hereinbefore described, will be arranged in each double pair of rolls, similarly to the arrangement shown in Fig. 5, to guide the rod, bar, or wire, or the like from the one pair of rolls to the other pair 110 of rolls of each double pair of rolls, the said pairs of rolls being arranged in the relative positions shown in Fig. 5, so that the said rod, bar, or wire, or the like will be delivered automatically from the one pair to the other of 115 each double pair of rolls of the series, and so back to that side of the series of rolls at which it was fed in, and a man standing on this side will receive the bar to pass it through the first rolls of each double pair of rolls. Shears similar 120 to those ordinarily employed are combined with the machine and driven by any suitable mechanism from the engine to trim the billet. The said shears are indicated at q in Fig. 1.

I do not limit myself to the precise details 125 hereinbefore described. For example, the engine may have one or more than two cylinders, and may be of any convenient construction or arrangement, and is provided with the usual or necessary adjuncts of engines, and 130 the gearing by which the motion of the said engine is transmitted to the rolls may be ar-

5 ranged in any convenient manner. Neither do
 I limit myself to the number of sets of rolls
 shown in the drawings nor to the number of
 grooves which there may be in each pair of
 rolls. Also, the guides may be arranged essen-
 10 tially as before described, but so as to pass
 the rod, bar, or wire, or the like through the
 rolls in any other desired direction. For ex-
 ample, in order to deliver the rod, or bar, or
 15 wire, or the like from the last rolls (at 5) at
 the same side at which the deliveries from
 the other rolls were made, a curved guide simi-
 lar to those hereinbefore described may be
 carried round beneath the lower roll of the
 20 last pair of rolls, so as to pass the said rod or
 bar back under the pair of rolls through which
 it last passed, (before passing it to the last
 pair of finishing-rolls 5,) and deliver the said
 rod or bar at the back of the rolls for ena-
 25 bling it to be conveniently passed through the
 finishing-rolls for delivery at the front side of
 the rolls. In Fig. 1 the course of the rod, bar,
 or wire, or the like through the rolls of the
 wire-mill is indicated by dot-and-pick lines.
 For the sake of clearness the guiding appli-
 30 cations are omitted from Figs. 1 and 3.

I claim—

30 1. The combination of rolls for rolling wire
 and the like in double pairs, one pair behind
 and at a less altitude than the other pair, and
 suitable guides for guiding the material from
 the pass in the front or upper pair to and so
 as to return it through the pass in the rear or
 lowermost pair, substantially as described.

35 2. In combination with the rolls arranged
 as described, a fixed bed or table, f , and piv-
 oted guide-piece g , the bed or table extending
 from the upper surface of the lower roll of the
 first and upper pair of rolls to the upper sur-
 40 face of the upper roll of the second or lower
 pair of rolls, the end g^3 bearing against the
 upper roll of the first pair of rolls and the
 other end, g^4 , curved over and partly around
 the upper surface of the upper roll of the sec-
 45 ond pair of rolls, substantially as and for the
 purpose set forth.

3. In combination with the rolls arranged
 as described, a curved guide-piece, i , table j ,
 and counterweighted pivoted lever k , the guide-
 piece being level with the upper surface of the
 50 lower roll of the second and lower pair of rolls,
 the table extending from the upper side of said
 lower roll to the front of the machine, and the
 lever k , having one end, k^3 , bearing against the
 under side of the upper roll of the second pair
 55 of rolls and the other end extending toward
 the front of the machine substantially parallel
 with the table, as set forth.

In testimony whereof I have signed my name
 to this specification in the presence of two
 60 subscribing witnesses.

ALFRED HUGHES.

Witnesses:

JAMES SMITH BEGG,

JAMES CUTHBERT,

Both of 115 St. Vincent Street, Glasgow.