

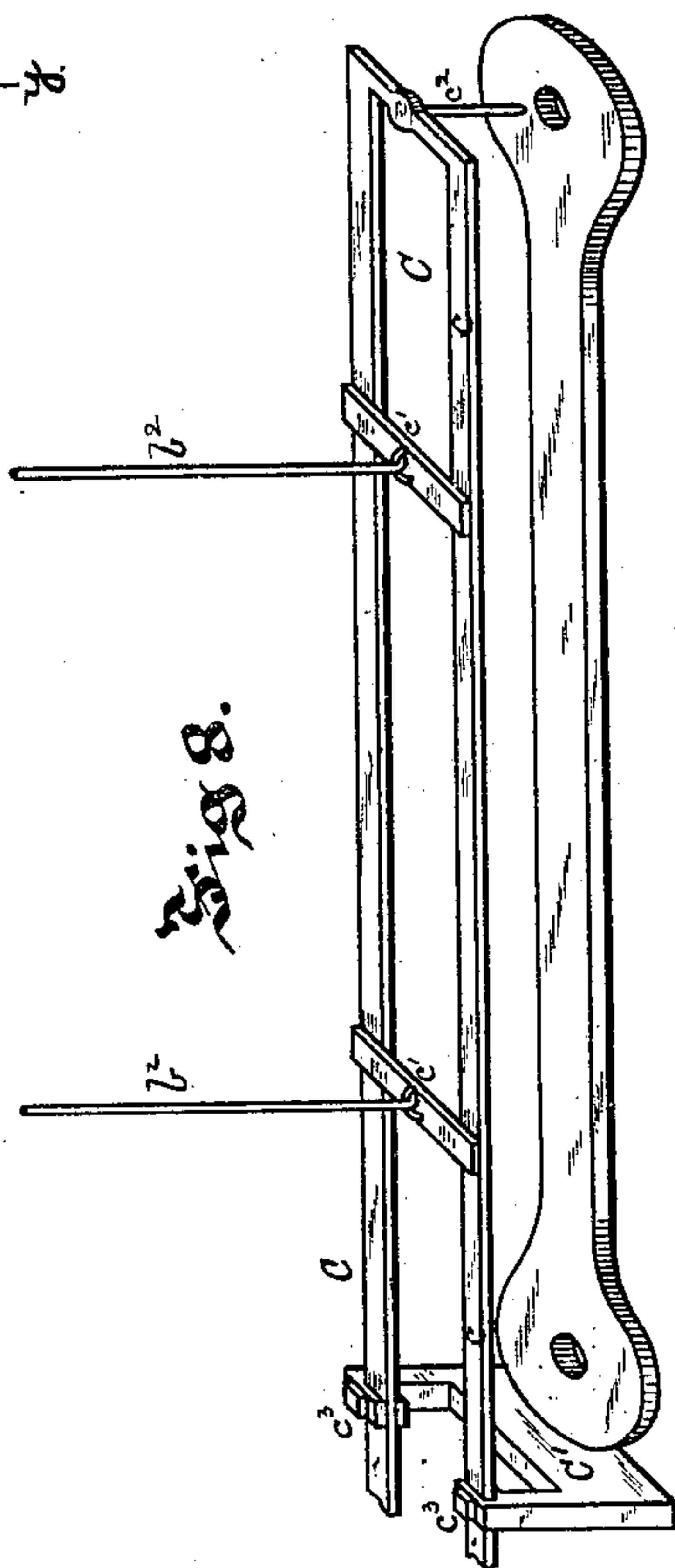
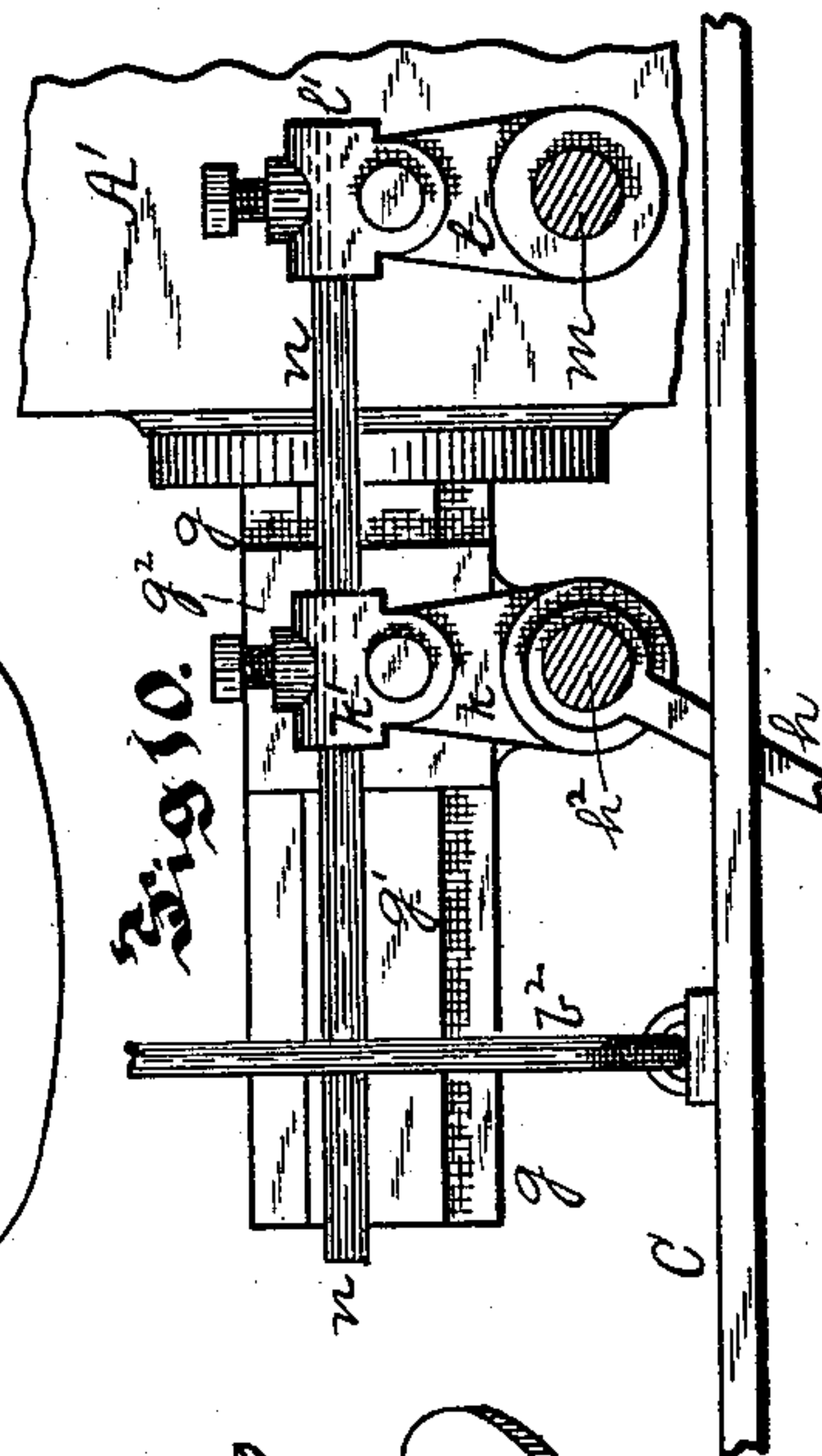
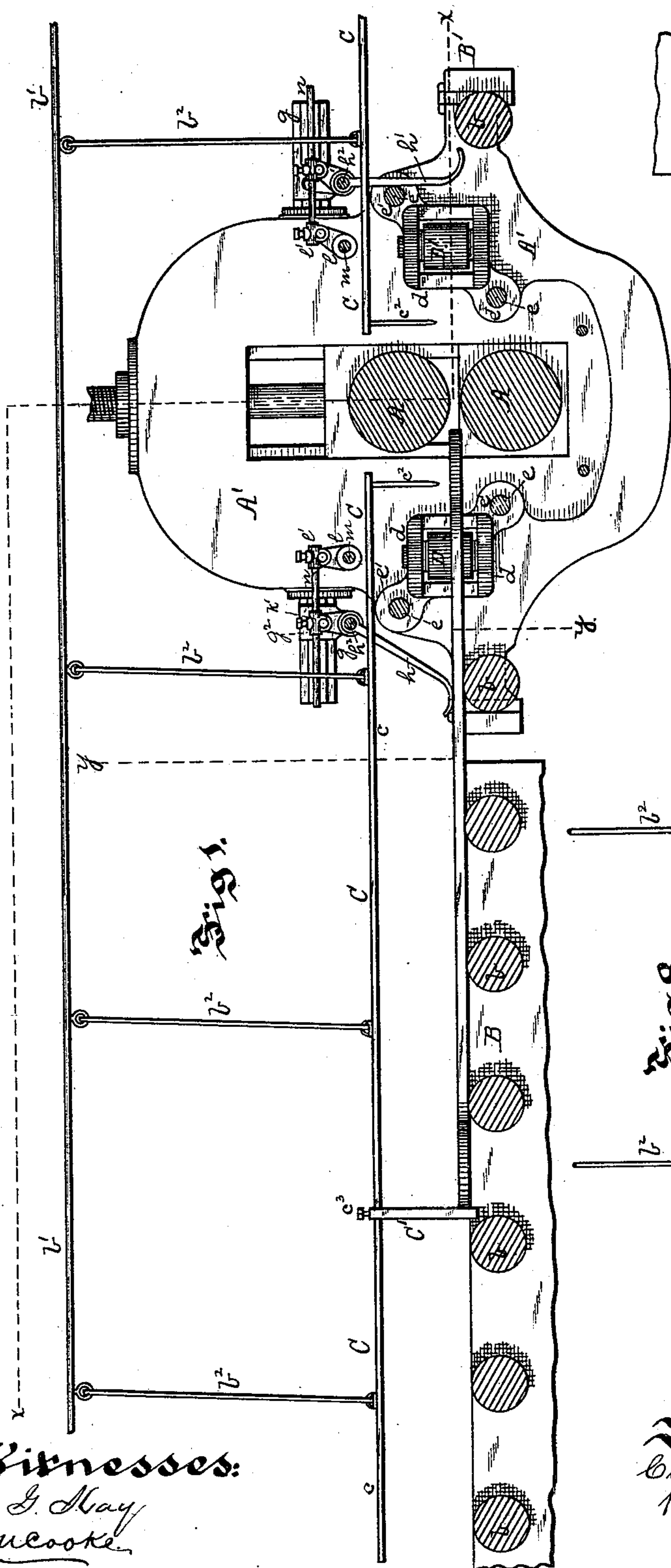
(No Model.)

5 Sheets—Sheet 1.

C. L. STROBEL.
APPARATUS FOR ROLLING EYE BARS.

No. 338,623.

Patented Mar. 23, 1886.



Witnesses:
J. G. May
J. Cooke

Inventor.
Charles L. Strobel
By James S. Kay
Attorney

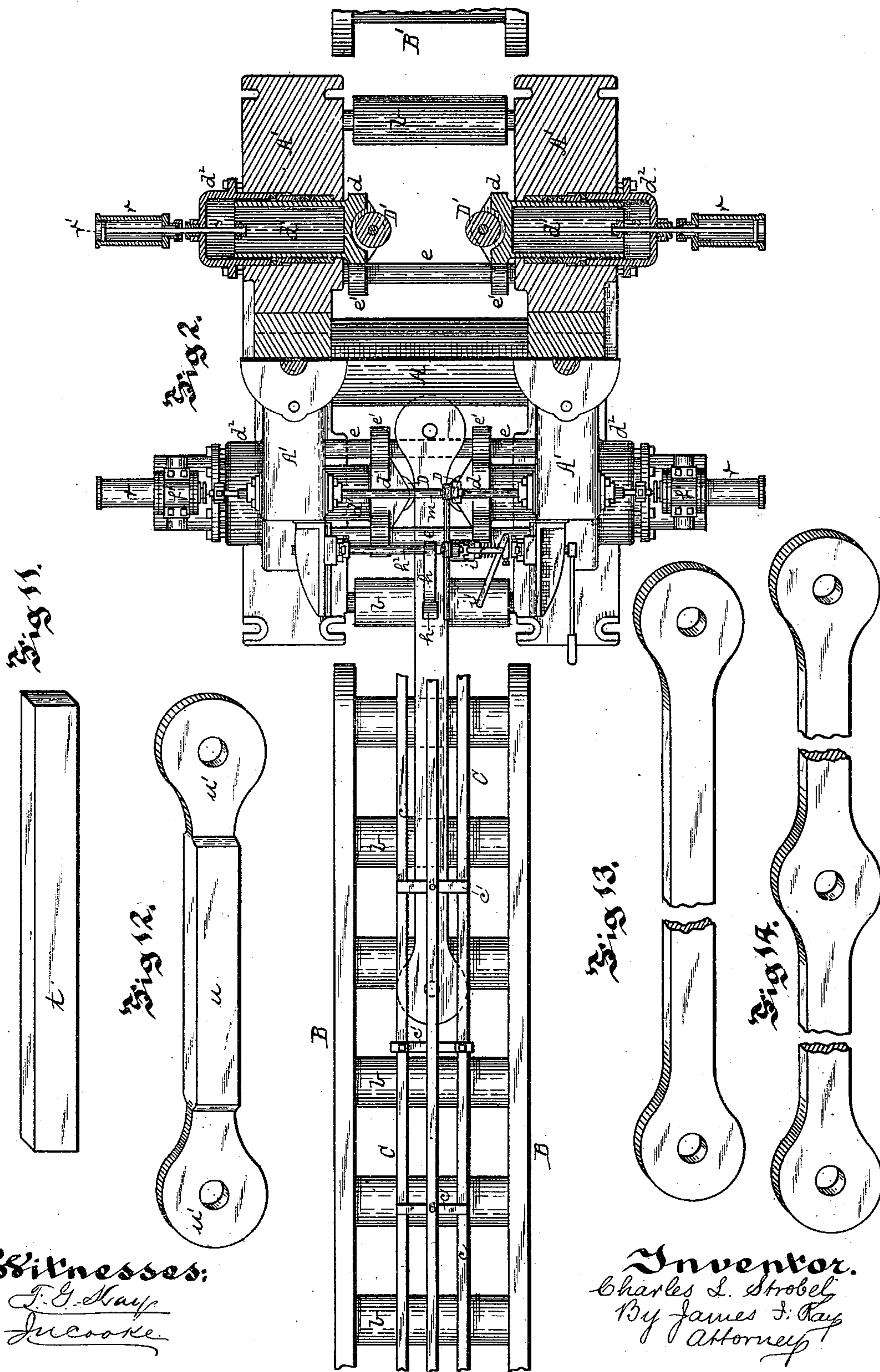
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Witnesses:
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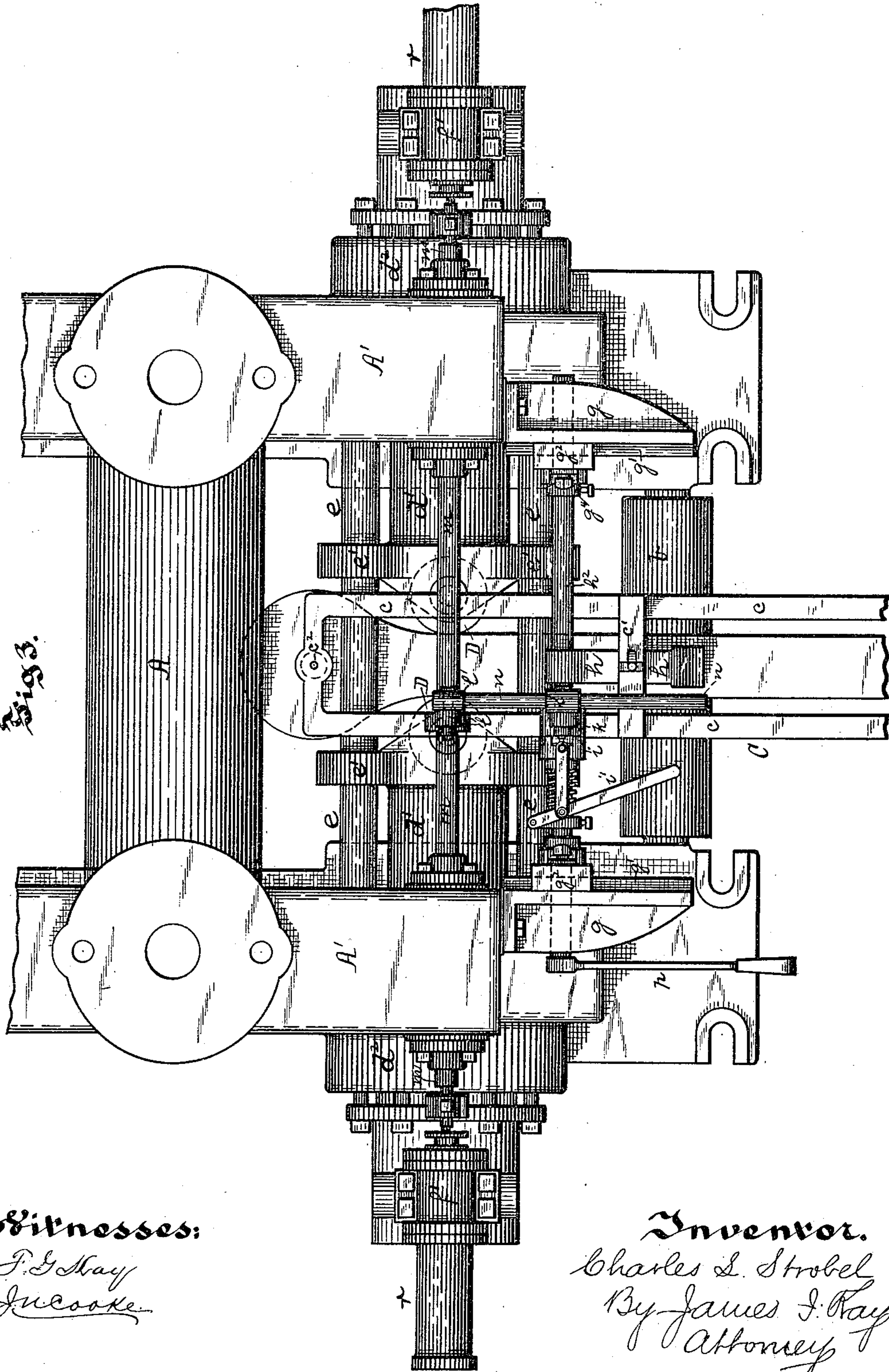
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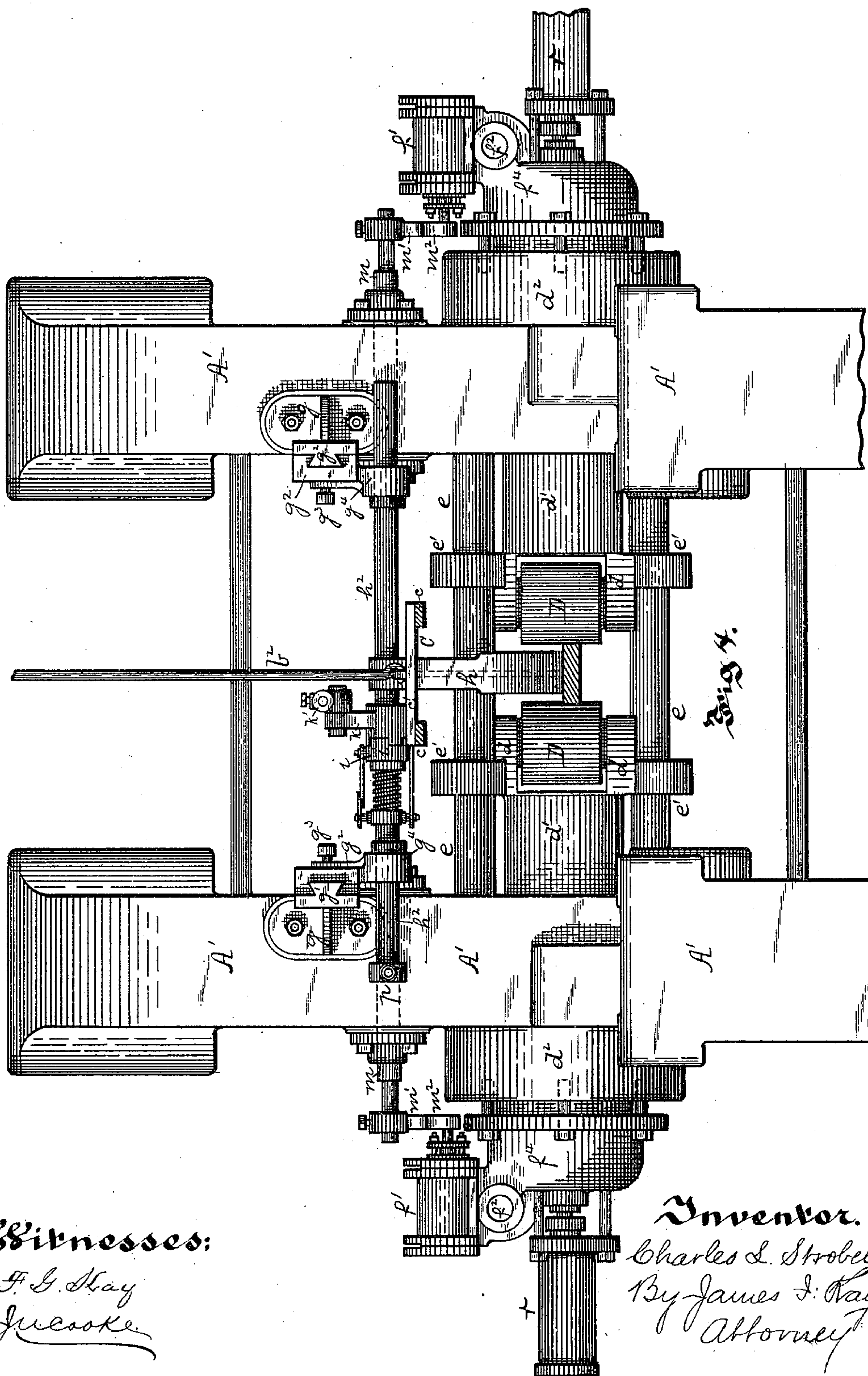
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C. L. STROBEL.
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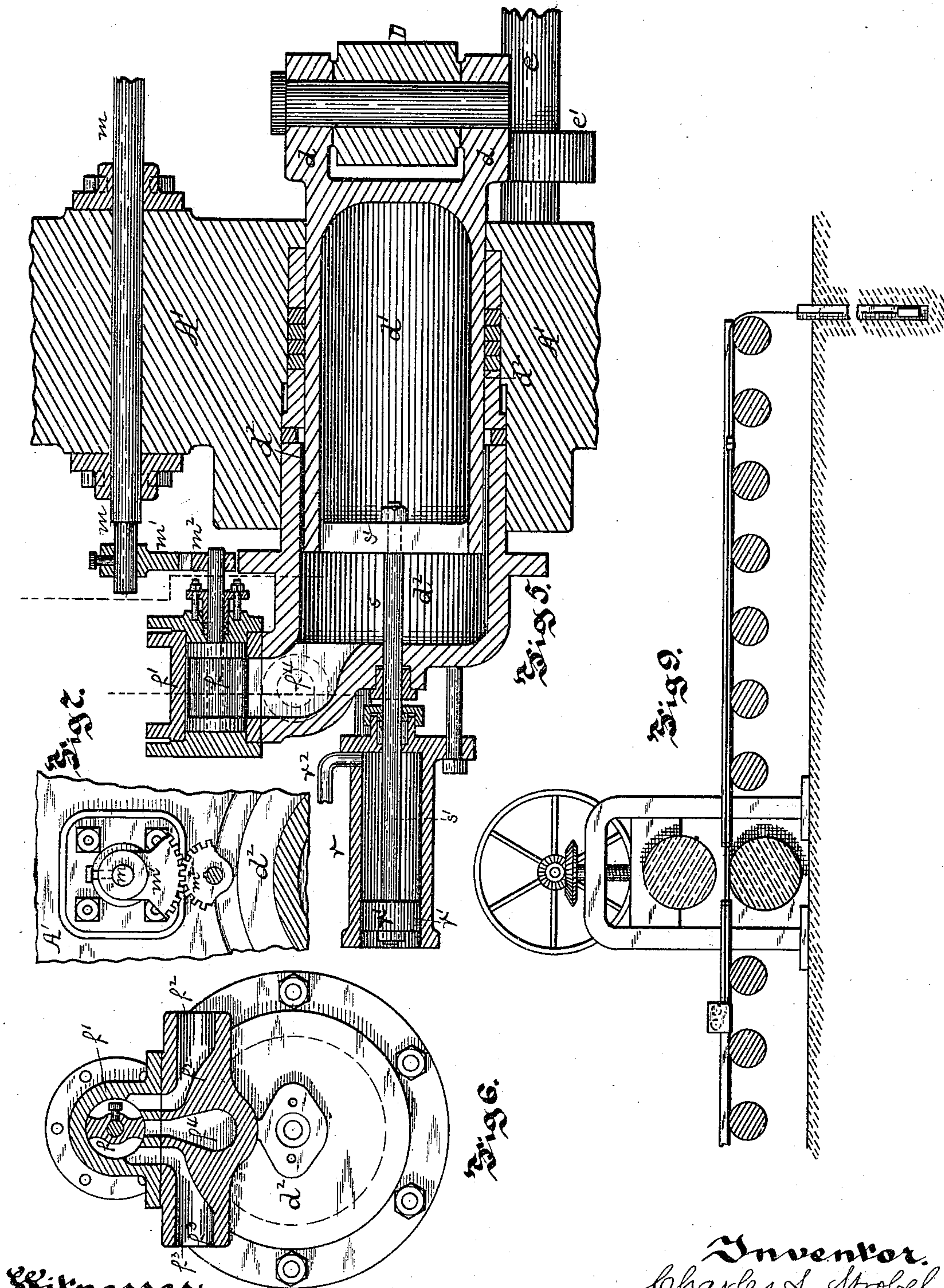
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UNITED STATES PATENT OFFICE.

CHARLES L. STROBEL, OF PITTSBURG, PENNSYLVANIA.

APPARATUS FOR ROLLING EYE-BARS.

SPECIFICATION forming part of Letters Patent No. 338,623, dated March 23, 1886.

Application filed October 9, 1885. Serial No. 179,397. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. STROBEL, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Rolling Eye-Bars; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the manufacture of eye-bars and bars having similar enlargements thereon, having special reference to apparatus for practicing the method of making eye-bars described and claimed in application for Letters Patent filed by me February 16, 1885, Serial No. 156,049. In said application is set forth a method of making these articles, consisting, substantially, in die-forging on a billet or slab enlargements of approximately the finished shape of head, and then reheating the blank so formed and rolling it to the required length and finished form of bar, the bar being thus brought to its final shape while in a uniformly-heated condition, and the formation of injurious strains in the bar being avoided. In forming the bar by said method it is found essential to provide means for accurately rolling to length, as the bar is substantially finished when leaving the rolls, and a slight variation in length might render the bar useless. It has also been found very desirable to edge-roll the bar between the heads, to prevent too great lateral spread and impart a neater finish thereto. By my invention I provide means for accomplishing both these ends, and also improve the apparatus in other particulars.

It consists, essentially, in combining with the reducing-rolls a gage located in the course of the bar rolled and adapted to indicate the length thereof.

It also consists in making this gage apparatus longitudinally movable with the bar, so that the bar, when pressing against the end piece thereof, may carry the gage with it and the length be indicated, no matter what may be the position of the bar on the feed-table.

It also consists in combining with the reducing-rolls edging-rolls and apparatus for advancing or permitting the retraction of the edging-rolls, to permit the passage of the heads or enlargements on the bar.

It also consists in the construction of the apparatus for operating these edging-rolls.

It also consists in certain details of construction hereinafter specifically set forth.

To enable others skilled in the art to make and use my invention, I will describe its construction and operation, referring to the accompanying drawings, in which--

Figure 1 is a longitudinal central section of a rolling-mill illustrating my invention. Fig. 2 is a horizontal section on the line $x x$, Fig. 1. Fig. 3 is an enlarged top view showing part of the housings and rolls. Fig. 4 is an enlarged cross-section on the line $y y$, Fig. 1, the horizontal rolls being omitted. Fig. 5 is a vertical central section of the apparatus for operating the edging-roll. Figs. 6 and 7 are detail views of such parts. Fig. 8 is a perspective view of the gage. Fig. 9 is a longitudinal section of a rolling-mill illustrating another form of gage. Fig. 10 is an enlarged detached view of the lever apparatus for operating the edging-rolls; and Figs. 11, 12, 13, and 14 are views illustrating the manufacture of the eye-bar.

In the drawings, $A A$ are the ordinary adjustable horizontal plate-rolls mounted in the housing $A' A'$, these rolls being operated in the ordinary manner, which it is unnecessary to describe herein. Extending out on each side of the housings are the feed-tables $B B'$, having the series of idle-rolls b therein, on which the bar is supported during reduction from the blank to the finished eye-bar.

Extending above the housings A' from end to end of the apparatus is the bar b' , from which is hung on each side of the housing by suitable rods or chains, b^2 , the measuring-gage C , this gage, in the form preferred, consisting of the frame c , having cross-bars c' , to which the chains b^2 are connected, and at the forward end the finger or pin c^2 , which extends down a short distance in front of the rolls A and indicates the center of the head when the bar is finished.

Secured to the frame c is the adjustable end piece, C' , of the gage apparatus, this end piece extending down from the frame in the course of the eye-bar on the feed-table, so that when the eye-bar strikes this end piece the finger c^2 will indicate at the end next to the rolls whether the bar has been rolled to the proper length. As the gage C is adapted to move longitudinally with the bar when it strikes the end piece, it is evident that as soon as the bar

ceases moving the gage will indicate the length of the bar, and it is not necessary to place the bar in any particular position to measure its length. The end piece, C' , is adjustable on the frame c in any suitable manner, in the apparatus shown the end piece being secured to the side bars of the frame by set-screws c^3 . The end piece is adjusted on the frame, so that the length from the end piece, C' , to the finger c^2 corresponds to that from one end of the finished bar to the center of the head of the opposite end.

Instead of the swinging gage hung from above the housings, other equivalent forms of longitudinally-moving gages may be employed, that shown in Fig. 9 being suitable for the purpose. In this case the end piece is mounted on rollers traveling on a track on the feed-table, and has connected thereto wire ropes or chains which carry marks indicating the proper length of bar, and the end of the eye-bar comes against and carries this end piece with it along the feed-table the length of the eye-bar to be formed.

The mill is provided with side or edging rolls, $D D'$ —one set on each side of the horizontal rolls A —these rolls acting to edge-roll the eye-bar during its reduction, and so form square edges and prevent the spreading of the bar, while at the same time they guide the bar in the passage through the reducing-rolls. As the heads of the eye-bar must pass between these edging-rolls, it is evident that means must be provided for permitting the opening of the rolls to allow the bar to enter the reducing-rolls, and for applying the pressure of the rolls quickly, so that they may press upon the edge-faces of the body as soon as the head passes between them. To accomplish this, the edging-rolls may be operated by any suitable power, that illustrated being hydraulic pressure. Each edging-roll is mounted in a bearing, d , having at its rear a piston or plunger, d' , which enters a cylinder, d^2 , formed within the housing A' , the bearing-surfaces of the piston and cylinder being suitably packed. The bearings d of the rolls are provided with the guide-lugs e' at diagonally-opposite corners, these guide-lugs fitting over and sliding on the cross-bars e , which extend across between the housings $A' A'$, and so form strong supports for the edging-rolls, which are guided in their movement by the cylinders within the housings and by these supporting cross-bars. As the bars pass through the lugs at the diagonal corners of the bearings, they extend across, above, and below the course of the eye-bar, and they have the further advantage of shedding any scale falling on their surface, so that there is no liability of the side rolls being clogged thereby. The pressure-cylinders d^2 of the rolls communicate through any suitable valve apparatus with a pipe carrying hydraulic pressure, one form of valve apparatus suitable for the purpose being shown in Figs. 5 and 6, the rotary valve f being mounted in a valve-chamber, f' , communicating through the passage f^2 with

the supply, through the passage f^3 with the exhaust, and through the passage f^4 with the cylinder d^2 . This valve f is opened automatically by the eye-bar as it passes back and forth through the rolls in the following manner: Bolted to the housings are the brackets g , having on their inner faces the horizontal dovetailed ways g' , on which are secured the hangers g^2 , these hangers having set-screws g^3 to secure them in position on the ways. At the base of each hanger g^2 is the bearing g^4 , the two bearings g^4 supporting the shaft h^2 , to which the drag h or h' is secured, this drag in its normal position hanging down in the course of the eye-bar as it passes over the feed-table, and being raised by and resting on the eye-bar, (its two positions being shown in Fig. 1,) and so imparting a partial rotation to the drag-shaft. On the drag-shaft is secured the spring-clutch i , having the handle i' , this clutch engaging with the lever k , which is mounted on the drag-shaft, the lever being thus connected to the drag-shaft by means of the clutch and moving with it.

On the same horizontal plane as the drag-shaft, and directly above the edging-rolls, is the shaft m , which is journaled in the housings A' , the ends of the shaft extending through to the outer faces of the housings. Secured to this shaft m is the lever l , and at the top of the levers k and l are mounted sleeves $k' l'$, through which sleeves the bar n passes, this bar being fastened therein by suitable set-screws, and through this bar n and the levers $k l$ the motion of the drag-shaft h^2 is imparted to the shaft m .

The drag-shaft is supported from the brackets having slides or ways, and the rod n is secured in the sleeves of the levers $k l$ by set-screws, to permit the adjustment of the drag-shaft toward or from the edging-rolls in the direction of the length of the apparatus, so that the apparatus may be employed in rolling bars having different sizes of heads. This is accomplished by unscrewing the set-screws binding the hangers to the ways and the bar n to the lever k and adjusting the drag-shaft and its connections to the proper position, in which it is again held by the set-screws. From this shaft m motion is imparted in any suitable manner to the valve f , whereby the edging-rolls are operated, that shown being a toothed segment, m' , secured at the end of the shaft m , meshing into a toothed segment, m^2 , on the end of the stem of the rotary valve f . When the eye-bar passes under and raises the drag, this turns the drag-shaft h^2 , and through the levers $k l$ and bar n imparts the same motion to the shaft m , which, through the segments $m' m^2$, turns the valve f , and so opens communication between the supply-passages f^2 and cylinders d^2 , and the water under pressure forces out the edging-rolls D or D' against the edges of the eye-bar passing through the rolls. The apparatus remains in this position until the eye-bar permits the drag to fall, when motion in the opposite direction is imparted

thereto, and the valve f opens communication between the cylinder d^2 and exhaust-passage f^3 , relieving the cylinders d^2 and pistons d' from pressure, so that the heads or enlargements on the eye-bar may press back the rolls and pass between them.

The drag-shaft is provided with the hand-lever p , for operating the valve apparatus and edging-rolls independently of the drag, this being necessary in some cases, as hereinafter described. When this hand-lever is employed, the clutch i is drawn out of connection with the lever k , the shaft h^2 turned to raise the drag out of the course of the eye-bar, and the clutch again thrown in connection with the lever k . It is also necessary to withdraw the edging-rolls for some purposes—such as when entering or withdrawing the blank or finished eye-bar—and for this purpose I have provided hydraulic apparatus at the end of the cylinders d^2 , this consisting of the cylinder r , having a piston or valve, r' , therein, said piston being connected by the rod s with the piston or plunger d' , forming part of the bearing of the roll-bearing d . The rod s passes through suitable stuffing-boxes in the cylinders d^2 and r , and is bolted to the cross-brace s' of the piston d' .

Communicating with the cylinder r is the pipe r^2 , hydraulic pressure being employed through this pipe to operate the piston r' in withdrawing the roll.

Instead of hydraulic pressure for operating the edging-rolls, other equivalent pressure—such as steam, pneumatic, spring, or lever pressure—may be employed for advancing or retracting them.

The operation of my improved apparatus is as follows: The blank u is first formed from the slab t in the manner described in the application filed by me February 16, 1885, before referred to, the heads u' being die-forged to approximately their finished shape, though generally slightly thicker than in the finished bar. The blank u is then placed in a suitable furnace and heated as a whole to a rolling-heat, and it is then fed to the reducing-rolls $A A$ over the feed-table B . To permit the bar to pass under the drag h , the operator disengages the clutch i from the lever k , and by means of the hand-lever p on the drag-shaft raises the drag h out of the course of the blank, which is then fed forward until caught by the rolls. As soon as the blank passes the drag, it is lowered by the operator, and the drag-shaft connected to the lever k , so that the apparatus is in position to operate automatically. As the blank passes out on the opposite side of the rolls $A A$ onto the table B' after the head u' passes the side or edging rolls, $D' D'$, it strikes against and raises the drag h' , and through the levers $k l$, bar n , and other apparatus, before described, opens communication between the hydraulic supply and the cylinder d^2 , so by hydraulic pressure advancing the edging-rolls $D' D'$, which press

upon the edge faces of the body of the blank between the heads u' and edge-roll, the body thereof preventing greater lateral spread than is desirable, and truing the corners of the bar. The pressure and rotation of the horizontal rolls $A A$ force the blank or bar through them into the position shown in Figs. 1, 2, and 3; but as the edging-rolls are simply idlers the bar is not carried farther, and upon the reversal of the mill the bar is fed from this position back to the horizontal rolls, and after the head u' passes the edging-rolls $D D$ on the opposite side it strikes the drag h and raises it, so, through the apparatus above described, advancing the edging-rolls $D D$. As the bar is fed through by the rolls $A A$, its rear end is withdrawn from the drag h' , permitting the drag to drop, and thus, through the apparatus above described, operating the valves f to relieve the edging-rolls $D' D'$ from the hydraulic pressure; and as the head u' at the rear of the bar is drawn through these rolls it presses them back out of its course, the pistons d' being forced in this way back into their cylinders d^2 , as shown in Fig. 2, the edging-rolls $D' D'$ being thus left in position to permit the entrance of the head u' of the bar upon the reversal of the apparatus. The operation is continued in this manner, the apparatus being operated automatically through the drags h and h' to edge-roll the body of the bar between the head until the bar is reduced to the desired thickness and brought to the required length. As the bar approaches the required length, its forward end strikes against the end piece, C' , of the measuring-gage C , and the exact length of the bar is then indicated by the finger c^2 , so that after each pass the exact length of bar is shown, and the operator can by increasing or decreasing the pressure of the reducing-rolls in the last pass or passes roll the bar to the exact length required. As the gage C is capable of longitudinal movement with the bar, it is evident that the length of the bar is indicated as soon as its end strikes the end piece of the bar, and that no time is lost in adjusting the bar for measurement, this being important in the rapid reduction of the blank to finished bar. When the bar is finished, the operator disengages the clutch i from the lever k , and through the lever p raises the drag h out of contact with the bar, and then connects the clutch and the lever k , so that he can operate the valve apparatus through the hand-lever p . He then turns the valve so as to relieve the edging-rolls from the hydraulic pressure, and by means of the pistons r' , within the auxiliary cylinders r , he withdraws the edging-rolls, so that the finished bar may be withdrawn.

Where it is desired to roll a bar having a head or similar enlargement between the heads, the automatic apparatus cannot be employed to advantage, as the pressure of the edging-rolls cannot be relieved for the passage of the intermediate head. In such cases the

apparatus is operated by the hand-levers, the drags being raised out of the course of the eye-bar on the table, as above described.

In rolling eye-bars having larger or smaller heads the drag is adjusted in the manner above described from or toward the edging-rolls, according to the size of the head, so as to operate the valve apparatus at the proper instant, either in applying or relieving the hydraulic pressure of the rolls.

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

1. In combination with reducing-rolls, a gage located in the course of the bar rolled and adapted to indicate the length thereof, substantially as and for the purposes set forth.

2. In combination with reducing-rolls, a longitudinally-movable gage located in the course of the bar rolled and adapted to indicate the length thereof, substantially as and for the purposes set forth.

3. In combination with reducing-rolls, a gage having an end piece against which the end of the bar strikes, substantially as and for the purposes set forth.

4. In combination with the reducing-rolls A, the gage device C, having the finger c^2 and adjustable end piece, C' , substantially as and for the purposes set forth.

5. In an apparatus for rolling eye-bars, the combination, with edging-rolls, of a drag located in the course of the moving eye-bar, and connections between the drag and the apparatus for adjusting said edging-rolls, substantially as and for the purposes set forth.

6. In apparatus for rolling eye-bars, the combination of longitudinally-moving edging-rolls mounted in bearings and provided with pistons or plungers, valve apparatus for operating the same, a drag in the course of the eye-bar, and connections between said drag and valve apparatus, substantially as and for the purposes set forth.

7. The combination of the housings, the cross-bars e , and the roll-bearing d , having guide-lugs e' at diagonally-opposite corners fitting over said cross-bars, substantially as and for the purposes set forth.

8. The combination of the housings having the cylinders d^2 therein, the cross-bars e , and the roll-bearings d , having the pistons or plungers d' , fitting in the cylinders, and the guide-lugs e' , substantially as and for the purposes set forth.

9. The combination of the housing having the cylinder d^2 therein, the roll-bearing d , having the piston or plunger d' , the auxiliary cylinder r , and the piston r' , connected to the piston d' , substantially as and for the purposes set forth.

10. The combination of the shafts h^2 m , levers k l , longitudinal bar n , the edging-rolls, and valve apparatus for operating them, substantially as and for the purposes set forth.

11. The combination of the drag-shaft, the drag h , and hand-lever p , connected thereto, the lever k , mounted thereon, and the clutch i , substantially as and for the purposes set forth.

12. The combination of the edging-rolls, the drag, connections between the drag and the apparatus for operating the edging-rolls, and apparatus for adjusting the drag toward or from the edging-rolls, substantially as and for the purposes set forth.

13. The combination of the housings, the horizontal ways g' , the hangers supported and adjustable thereon, the drag-shaft mounted in said hangers, and the drag, substantially as and for the purposes set forth.

14. The combination of the housings, the shaft m , mounted therein and carrying the lever l , the horizontal ways g' , the hangers supported and adjustable thereon, the drag-shaft, the hanger, the lever k , and the bar n , adjustably secured to said levers, substantially as and for the purposes set forth.

In testimony whereof I, the said CHARLES L. STROBEL, have hereunto set my hand.

CHARLES L. STROBEL.

Witnesses:

JAMES I. KAY,
J. N. COOKE.