(No Model.)

4 Sheets—Sheet 1.

L. ACHESON.

LINK BENDING MACHINE.

No. 254,896. Patented Mar. 14, 1882.

Fig. 1.

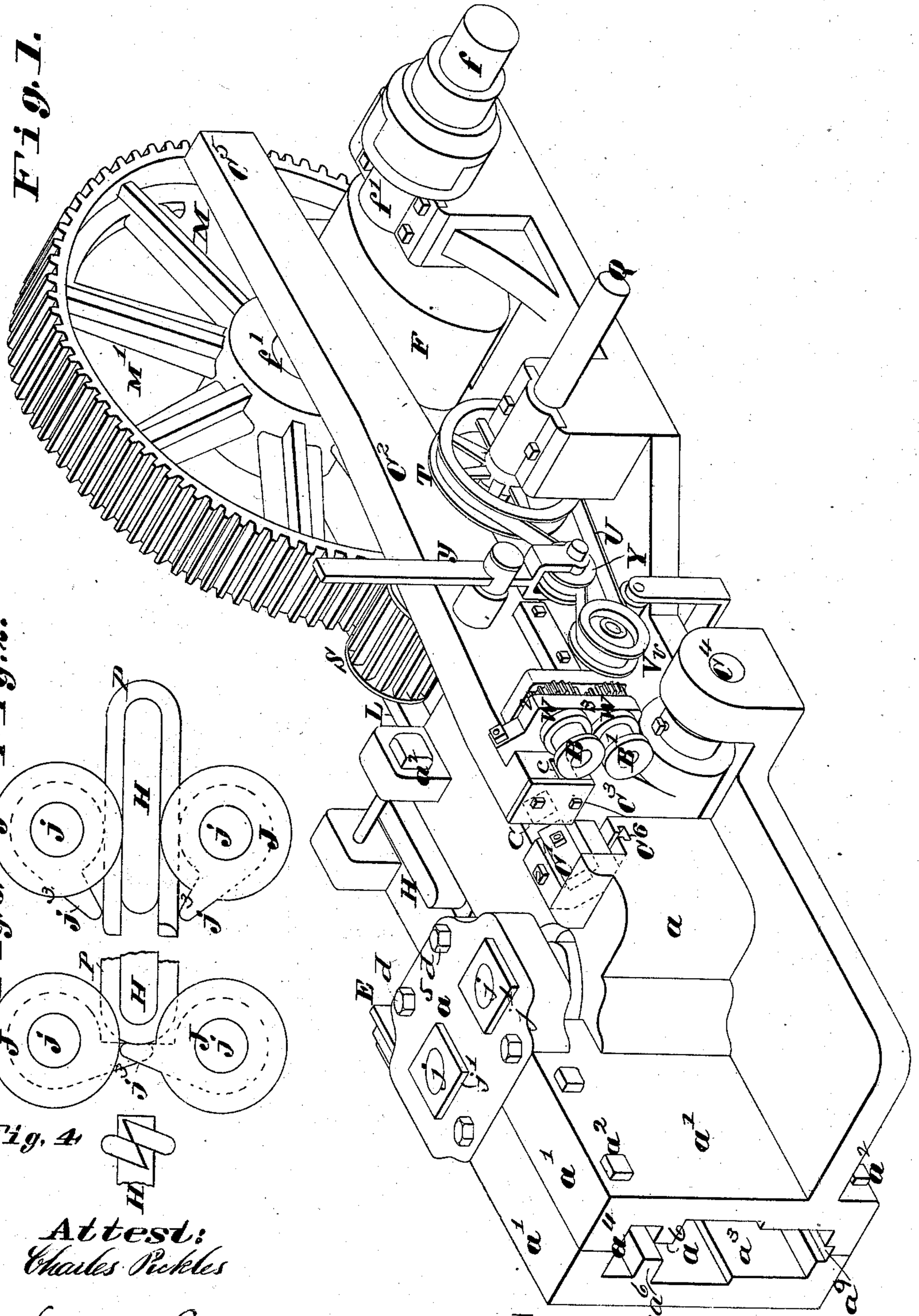
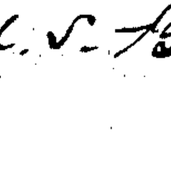


Fig. 2.

Fig. 3.

Fig. 4



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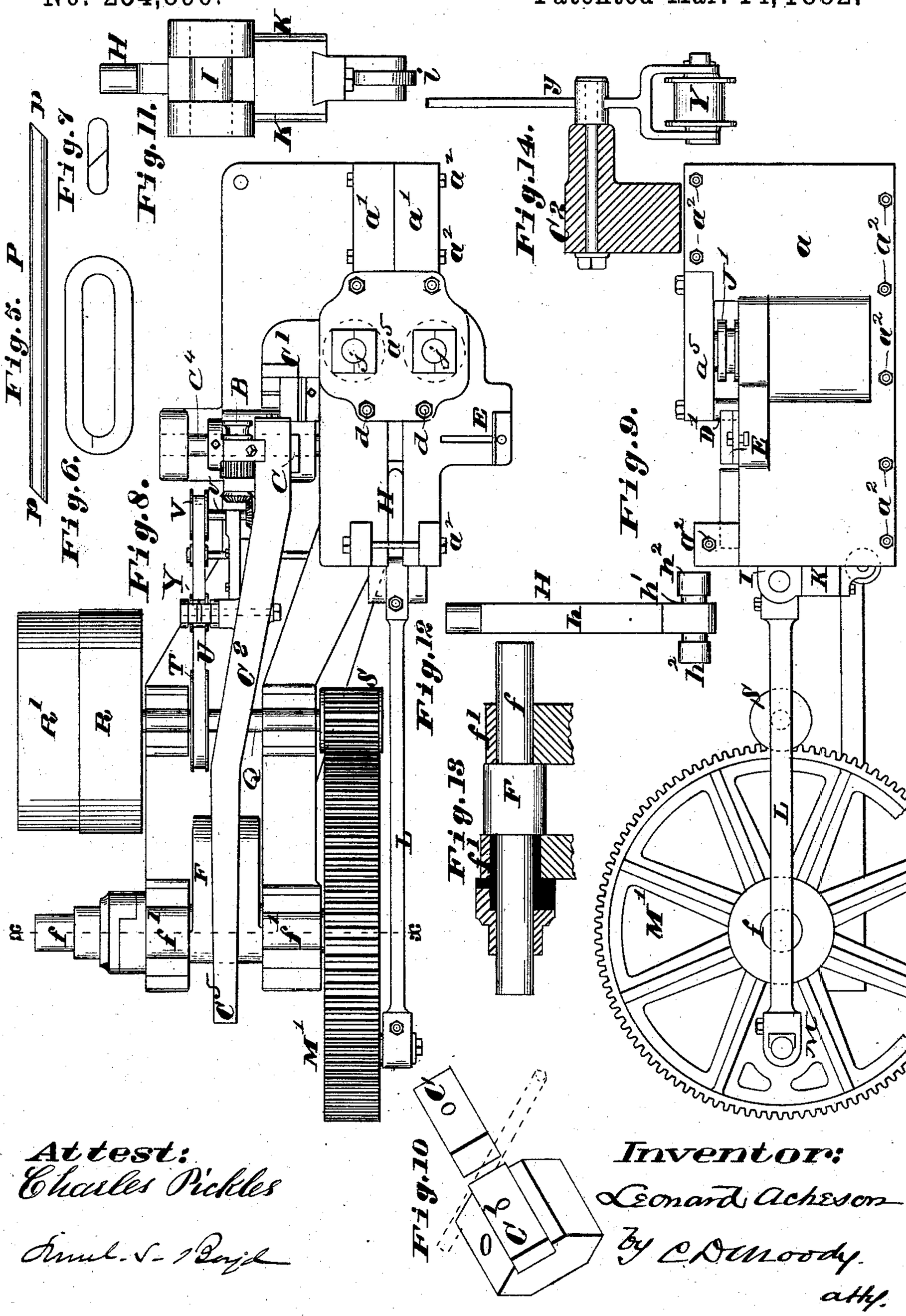

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LINK BENDING MACHINE.

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Fig. 15

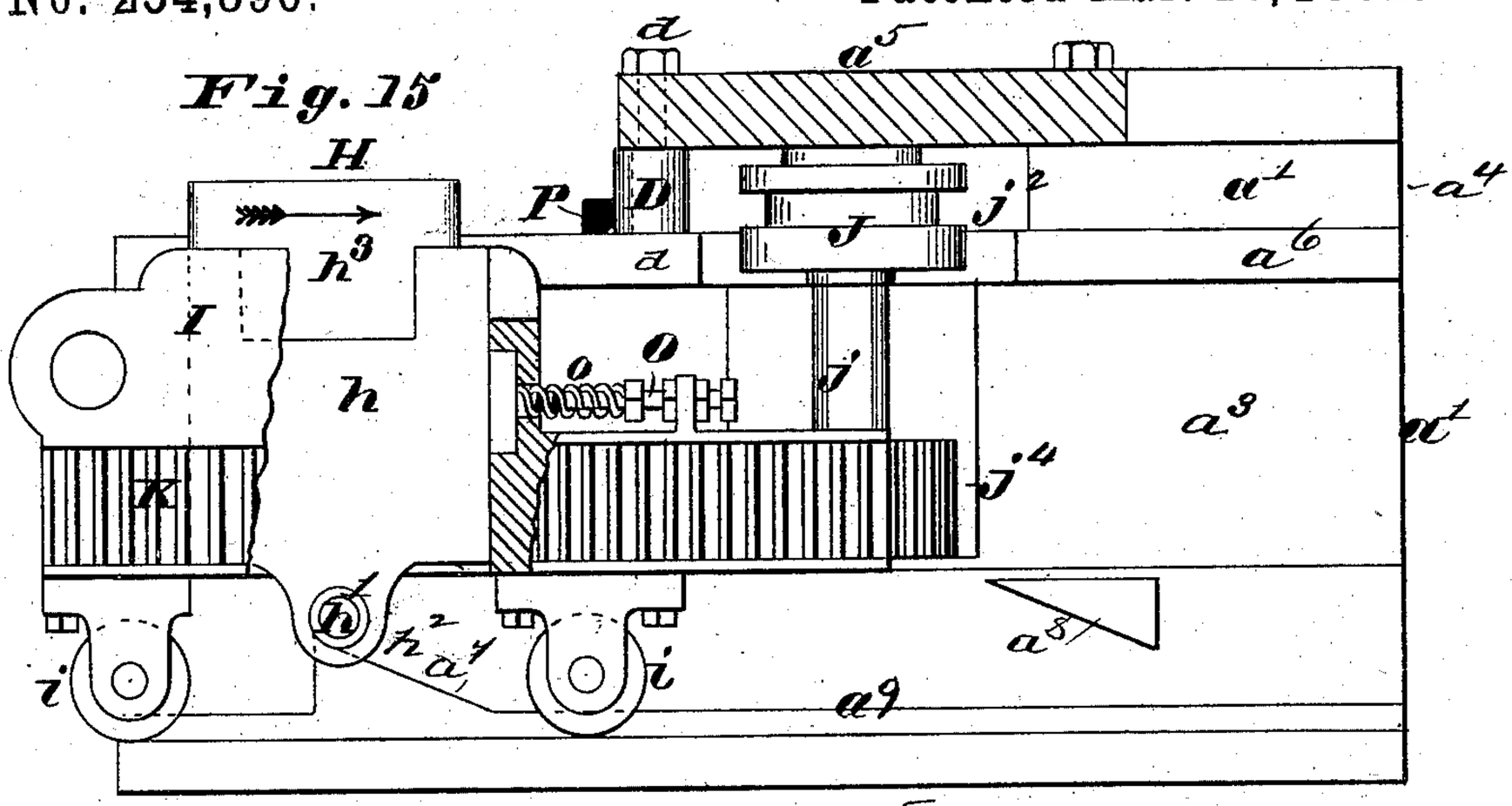


Fig. 16.

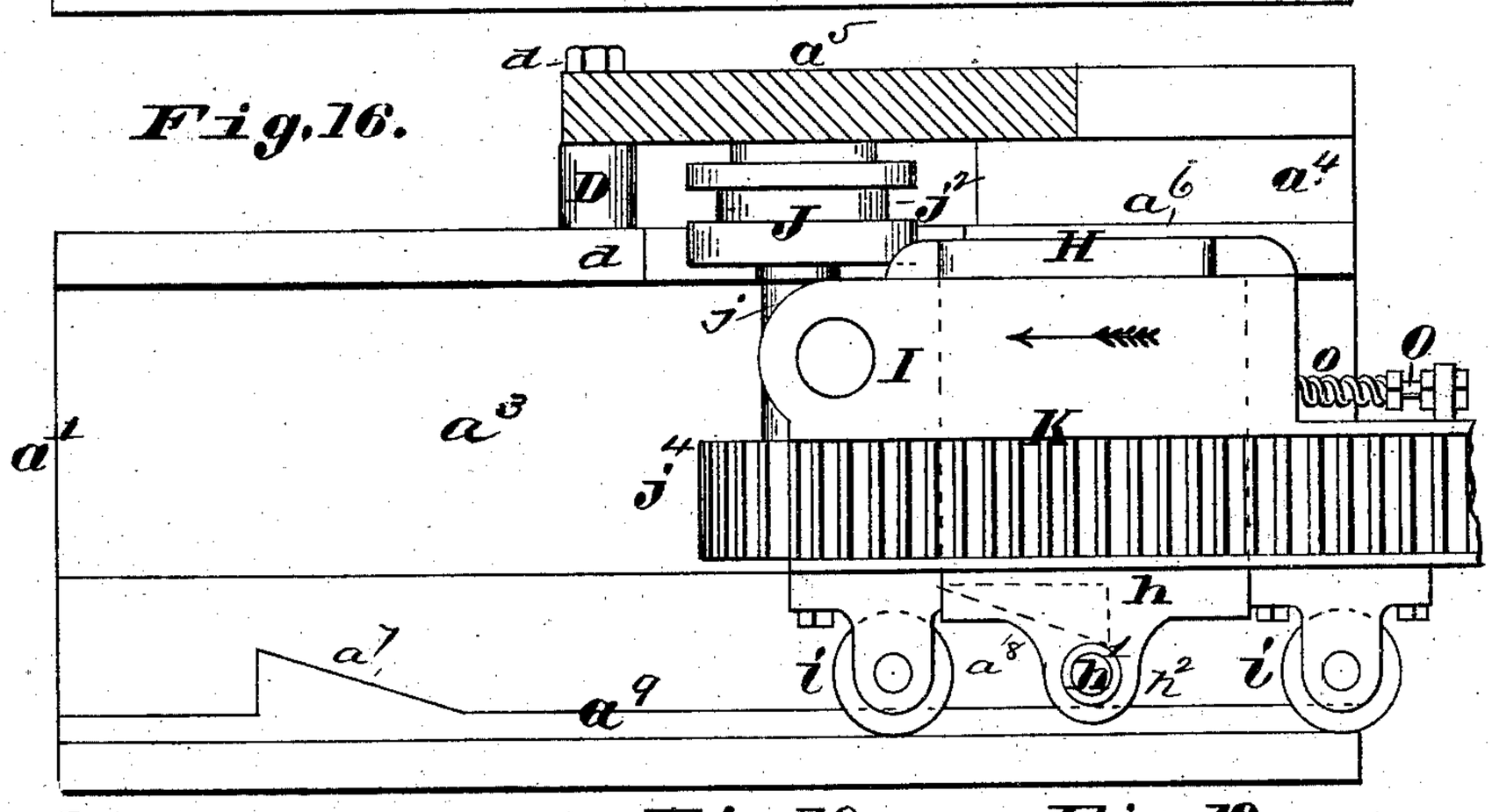


Fig. 17.

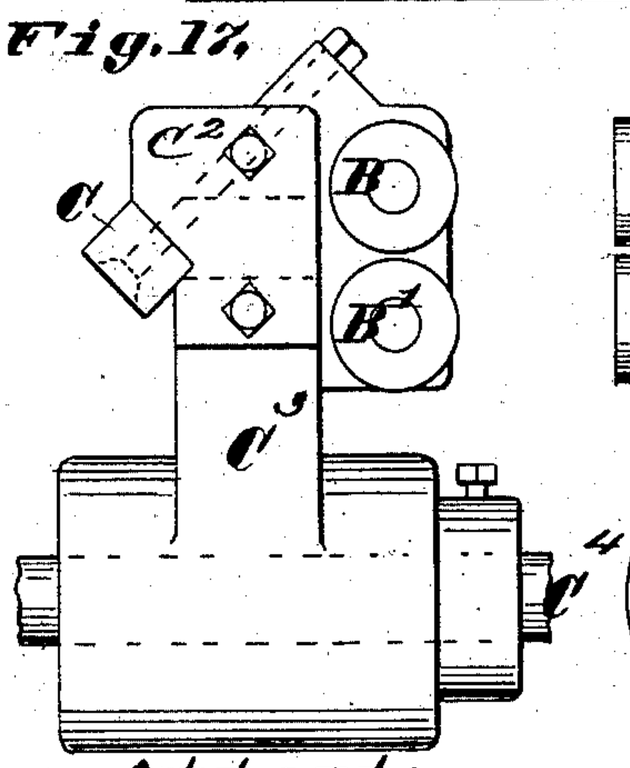


Fig. 18

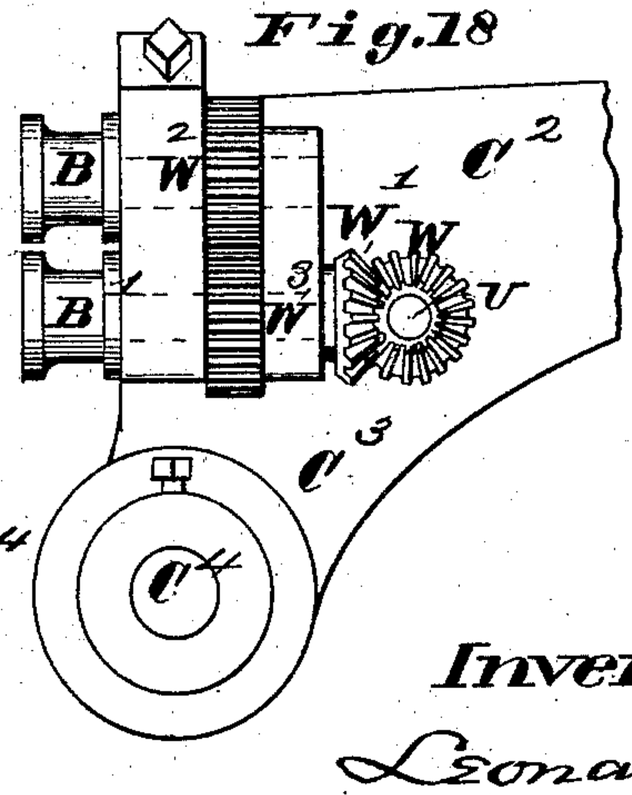
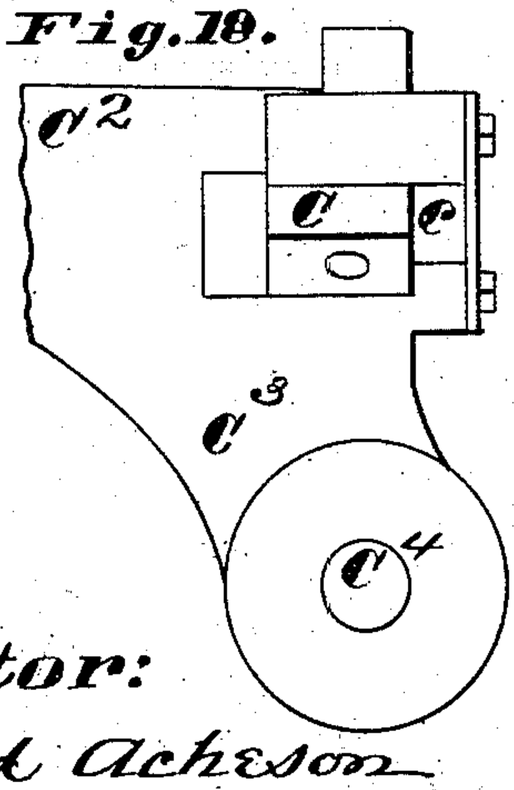


Fig. 18.



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(No Model.) 4 Sheets—Sheet 4.

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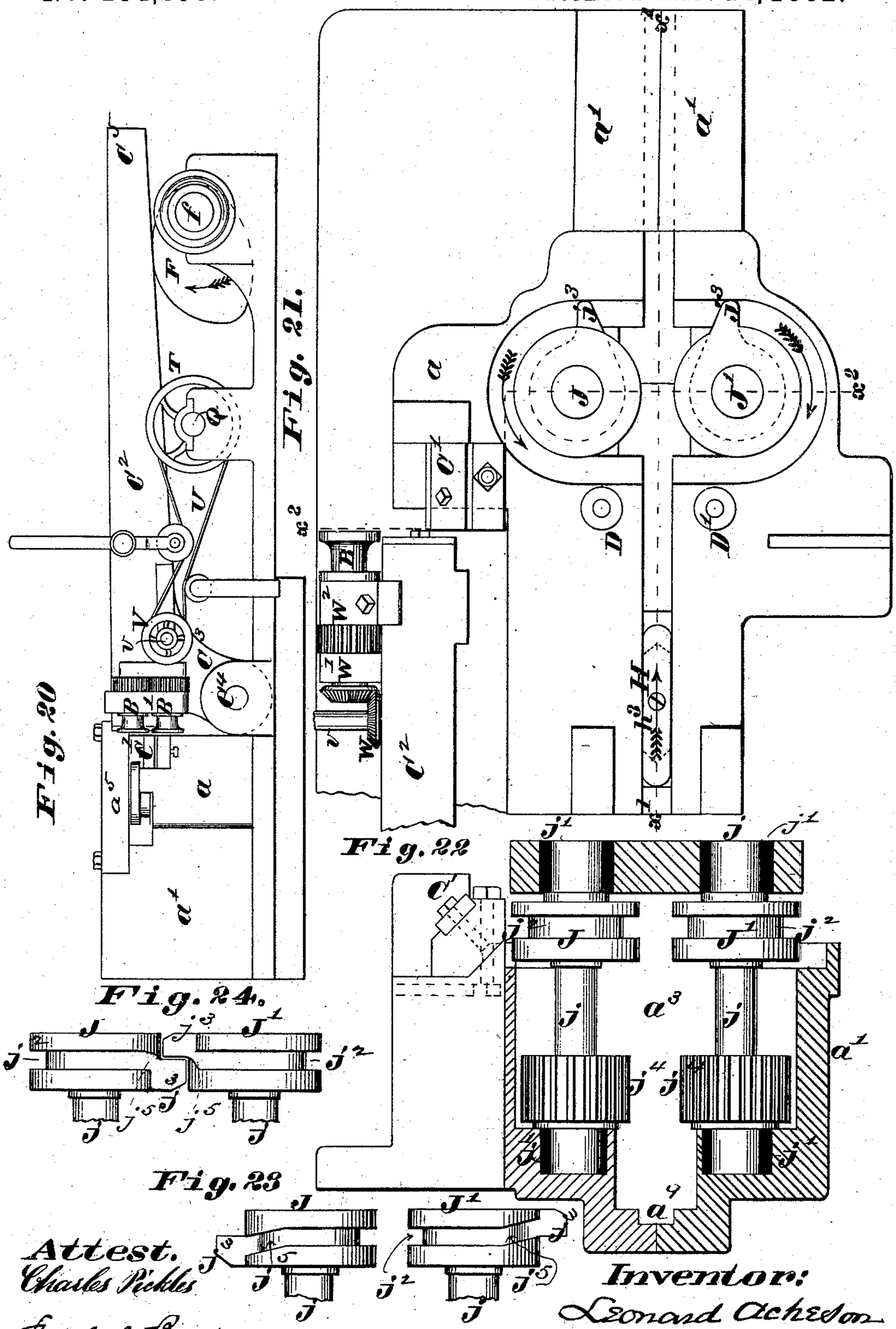

UNITED STATES PATENT OFFICE.

LEONARD ACHESON, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE HELMBACHER FORGE AND ROLLING MILLS COMPANY, OF SAME PLACE.

LINK-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 254,896, dated March 14, 1882.

Application filed October 29, 1881. (No model.)

To all whom it may concern:

Be it known that I, LEONARD ACHESON, of St. Louis, Missouri, have made a new and useful Improvement in Link-Bending Machines, of which the following is a full, clear, and exact description, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a view in perspective of the machine. Figs. 2 and 3 are top views of that portion of the machine immediately used in closing the link after it has been bent into a U shape; Fig. 4, an end view of the link upon the mandrel; Fig. 5, a view of the bar cut to the proper length for forming the link; Figs. 6 and 7, a plan and an end view, respectively, of the link as formed by the present machine; Fig. 8, a plan of the machine; Fig. 9, a side elevation; Fig. 10, a view in perspective, showing in their relative positions the blades of the shearing mechanism; Fig. 11, an end elevation of the mandrel and its supporting-carriage; Fig. 12, an end elevation of the mandrel; Fig. 13, a detail, being a section taken on the line *x x* of Fig. 8; Fig. 14, a vertical transverse section taken through the movable shear-arm, and showing the tightening-pulley; Fig. 15, a vertical longitudinal section taken on the line *x' x'* of Fig. 21, the top plate being in place, the view showing the mandrel at the forward limit of its stroke; Fig. 16, a similar section, but showing the mandrel at the rearward limit of its stroke; Fig. 17, a front end elevation of the movable shear and supporting-arm and bearing; Fig. 18, a side elevation of the last-named part, and Fig. 19 an elevation of the side of the shear opposite to that shown in Fig. 18; Fig. 20, a side elevation of the machine, being the side opposite to that shown in Fig. 9; Fig. 21, a plan of that portion of the machine immediately connected with the bending mechanism, the top plate having been removed; Fig. 22, a vertical transverse section taken on the line x^2 x^2 of Fig. 21; and Figs. 23 and 24, side elevations of the device used in closing the link, in Fig. 23 the closing-arms being shown separated and in Fig. 24 closed together.

The same letters denote the same parts.

In the present machine the links are made from bar-iron. The bar, as it comes from the rolls, is fed into the machine, by which it is cut into suitable lengths that are successively shaped into links and finished, with the exception of welding the lapped ends.

The improvement relates to the feeding mechanism, to the shearing mechanism, and to the mechanism for shaping the links.

In the annexed drawings, B B' represent the rolls for feeding the iron to the shearing mechanism C C', the rolls being attached to and moving with the shear C. The shears are arranged, as seen in Figs. 1, 8, 10, 17, 19, 22, to cut the bar obliquely and into lengths, as shown in Fig. 5, the bar being passed between the rolls B B', thence through an opening, *c*, in the end of the shear-arm C^2, thence in front of the shear C, between it and the shear C', thence past the rolls D D' used in bending the iron, and to the gage E. The shear C' is stationary, being suitably held in the part *a* of the frame of the machine. The shear C is movable, being held, as seen in Figs. 8, 17, 18, 19, upon an arm or lever, C^2, which is extended downward at C^3 to bear and rock upon a fulcrum, C^4, and extended rearward at C^5 to ride upon a cam, F, the latter being attached to the shaft *f*, which turns in the bearings *f' f'*, the rotation of the cam effecting the operation of the shears.

H represents a former or mandrel. Its office is to force the straight pieces of iron coming from the shears between the rolls D D', thereby forming them into a U shape, and then to serve as a mandrel for closing thereupon the U-shaped pieces into links. To this end the mandrel is of suitable shape for forming the links thereon, and it has a reciprocating movement between the rolls D D'. The frame of this portion of the machine is in the form of two uprights, *a' a'*, suitably bolted together at a^2 a^2, and shaped inside to form a chamber, a^3, to admit and provide for the movement of the mandrel and its supporting-carriage I, and also to admit the mechanism used in closing the links. An outlet, a^4, is also provided for the discharge of the links when formed. The rolls D D' are suitably spaced apart for folding the piece upon the mandrel

as the latter passes between the rolls, and they are hung upon spindles *d d*, the lower ends of which are held in the uprights *a' a'* and the upper ends in a top plate, a^5, which in turn is suitably fastened to the uprights *a' a'*.

Beyond the rolls D D', and in the same plane, and respectively in line with the rolls, are arranged two heads, J J', having a vibratory rotary motion. They serve partly to guide and hold the piece of iron properly to the mandrel after the latter has carried the piece beyond the rolls D D'; but they serve more especially in the final closing of the piece entirely around the mandrel. They are attached to shafts *j j*, which are held and turn in the bearings *j' j'*. They are grooved at j^2 to receive the U-shaped iron, and they are furnished with the arms j^3 j^3 for bending the iron, as hereinafter explained, and with the pinions j^4 j^4, through which the motion is imparted to the shafts *j j*, the pinions engaging respectively with the racks K K upon the sides of the carriage I. The latter is shown in Figs. 11, 15, 16. Its office is to move the mandrel to and fro between the positions shown respectively in Figs. 15 and 16. Its supporting-wheels *i i* travel in the groove a^9. Its reciprocating movement is imparted to it by means of the rod L, which leads to the crank M upon the shaft *f*.

The mandrel H is provided with a shank, *h*, that fits in a mortise of corresponding shape in the carriage I, extending downward through the mortise, and at its lower end having a cross-arm, *h'*, with friction-rollers h^2 h^2 thereon, and for the following purpose: After the mandrel has forced the piece of iron from which the link is made between and past the rolls D D', and after the piece has been closed around the mandrel, as in Figs. 3 and 4, it is necessary to disengage it therefrom and provide for returning the mandrel to its original position. This is effected by drawing the mandrel, after it has been carried past the heads J J', downward and leaving the link supported upon the ledges a^6 a^6 of the frame *a' a'*, and then, after the mandrel has been drawn away from beneath the link, raising it again above the ledges. This raising and lowering of the mandrel in the carriage is caused by the rollers h^2 h^2 encountering the inclined planes or projections a^7 and a^8, respectively—that is, as the carriage I is moved into the position of Fig. 15 the rollers ride upon the planes a^7, causing the mandrel to move upward in the mortise in the carriage, and as the carriage is moved into the position of Fig. 16 the rollers pass under the planes a^8 and the mandrel is drawn downward in the mortise. A bolt, O, actuated by a spring, *o*, produces sufficient friction upon the side of the shank *h* to uphold the mandrel for the time being, in whichever position it may be left by the action of the rollers h^2 and planes a^7 a^8. The latter are attached to the frame *a' a'*, and project one from each side of the frame sufficiently to encounter the rollers h^2 for the purpose described. As the carriage I is moved to and fro the racks K K engage with the pinions j^4 j^4 and impart a vibratory rotary movement to the shafts *j j*, heads J J', and arms j^3 j^3, and at the proper time cause the arms j^3 j^3 to bear upon and close the iron around the passing mandrel, as seen in Fig. 3. To provide for lapping the ends *p p* of the iron P around the mandrel, the grooves j^2 j^2 in the heads J J' are inclined at j^5 and the arms j^3 j^3 are relatively arranged so as to pass each other, as shown in Fig. 24.

Q represents the main shaft of the machine. It is provided with the fast and loose pulleys R R', the pinion S, and the pulley T. The pinion S engages with the gear M' upon the shaft *f*, imparting motion to the cam F and to the crank M, which, as shown, may be in one piece with the gear M'. A belt, U, leads from the pulley T to a pulley, V, which is attached to a shaft, *v*, upon the shear-arm C^2. The motion of the pulley T is thus imparted to the shaft *v*, and thence through the gears W W' W^2 W^3 to the feed-rolls B B'.

Y represents a tightening-pulley attached to and moving up and down with the shear-arm C^2. As the arm C^2 is raised to shear the bar the pulley is lifted away from the belt U, causing the feed-rolls B B' to stop and the feeding of the bar to the shears to be arrested; but with the downward movement of the shear-arm the pulley Y tightens the belt U and sets the feed-rolls B B' in operation. In this manner the feeding of the bar into the machine is suspended during the shearing. The pulley Y is attached to an arm, *y*, which is vertically adjustable upon the shear-arm. The bar, after being carried by the mandrel past the rolls D D' and heads J J', and after being formed into a link, is left upon the ledges a^6 a^6 until the next link is formed, which, coming against the first link, causes it to be discharged at the outlet a^4, and so on as the links are formed.

The head h^3, Figs. 15 and 21, of the mandrel is detachable from the shank *h*, to enable larger or smaller mandrels to be used, according to the size of link it is desired to make; and as the length of the bar P varies according to the size of link to be made the shearing mechanism is made laterally adjustable upon the machine, to which end the cam F is made wider, as shown, than the arm C^5. The arm C^2 and extension C^3 are laterally adjustable upon the fulcrum C^4, and the shear C' is made laterally adjustable in the slot C^6, Fig. 1, of the part *a*. By adjusting the shears nearer to or farther from the mandrel a shorter or longer blank, P, can be cut from the bar.

I claim—

1. The combination of the shear-arm C^2 and the feed-rolls B B', substantially as described.

2. The combination of the shear-arm C^2, the feed-rolls B B', and the shears C C', substantially as described.

3. The combination of the frame *a*, the shear C, the arm C^2, having the extension C^3, the fulcrum C^4, and the shear C', said shears being arranged as shown and described.

4. The combination of the shear-arm C^2, the feed-rolls B B′, the gears W W′ W^2 W^3, the shaft *v*, and the pulley V, substantially as described.

5. The combination of the shear-arm C^2, the feed-rolls B B′, the gears W W′ W^2 W^3, the pulley V, the belt U, the pulley T, and the pulley Y, substantially as described.

6. The combination of the shear-arm C^2, the pulley V, the belt U, the shaft Q, the pulley T, and the pulley Y, substantially as described.

7. The combination of the mandrel H, having the shank *h*, the carriage I, and the friction-bolt O and spring *o*, substantially as and for the purpose set forth.

8. The combination of the frame a' a', the projections a^7 a^8, the carriage I, having the mortise, the mandrel H, having the shank *h*, and the arm h', and the friction-bolt O and spring *o*, substantially as described.

9. The combination of the frame a' a', having the ledges a^6 a^6, the rotating heads J J′, the carriage I, and the mandrel H, said mandrel being vertically adjustable in said carriage, as and for the purpose set forth.

10. The combination of the frame a' a', having the ledges a^6 a^6, the mandrel H, the rolls D D′, and the rotating heads J J′, substantially as described.

11. The combination of the frame a' a', the rolls D D′, the mandrel H, the heads J J′, the shafts *j j*, the pinions j^4 j^4, the carriage I, and the racks K K, substantially as described.

LEONARD ACHESON.

Witnesses:
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SAML. S. BOYD.