

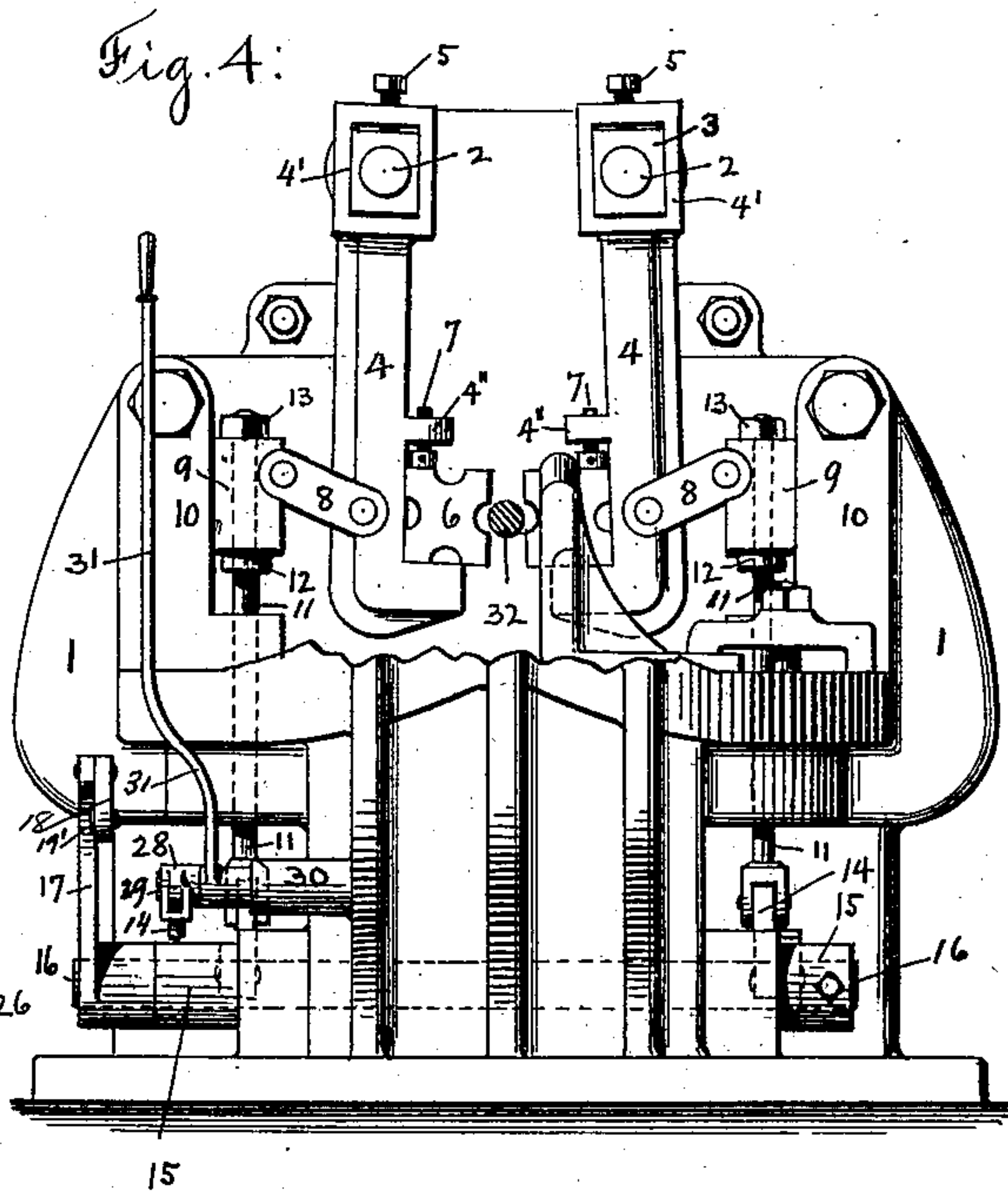
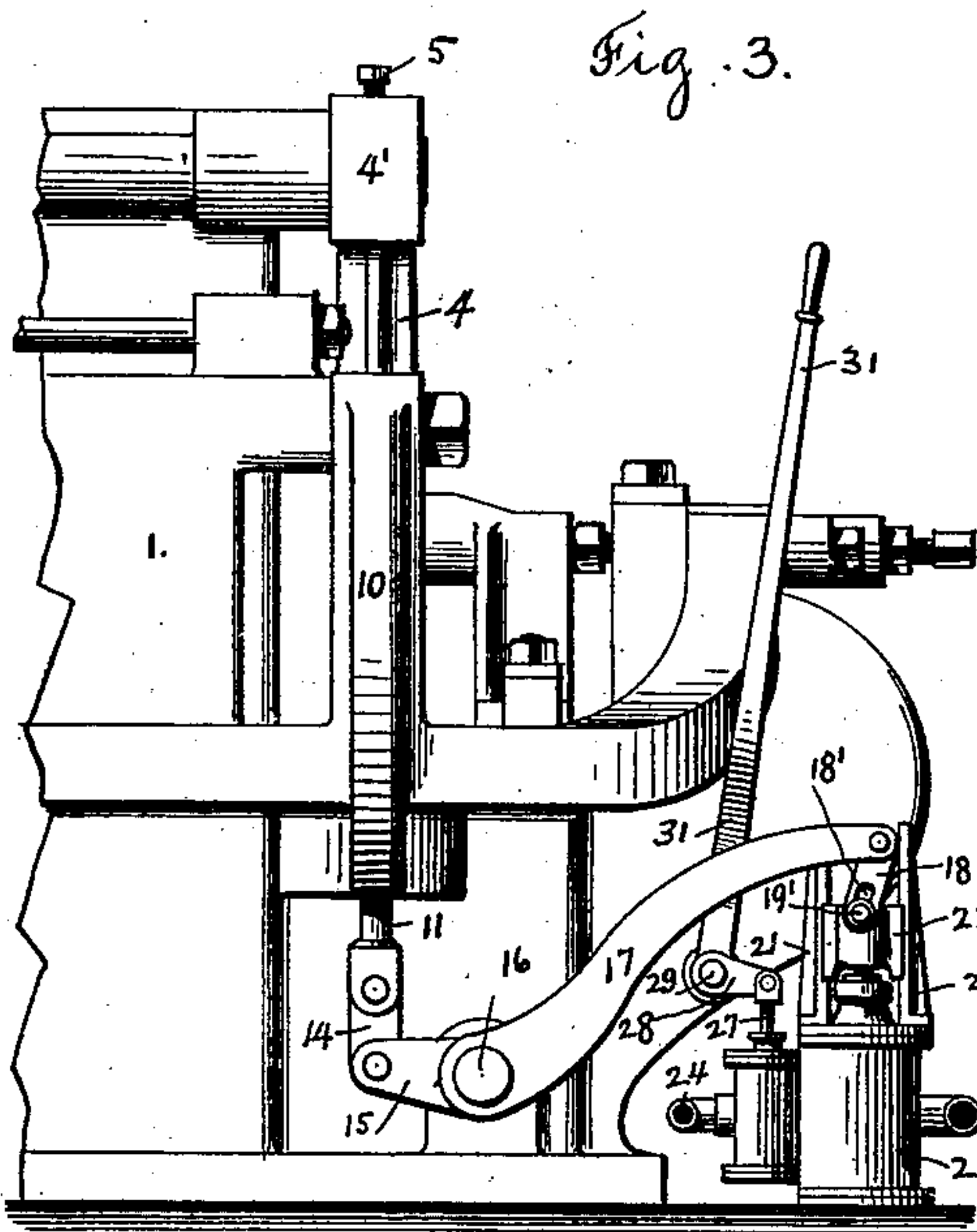
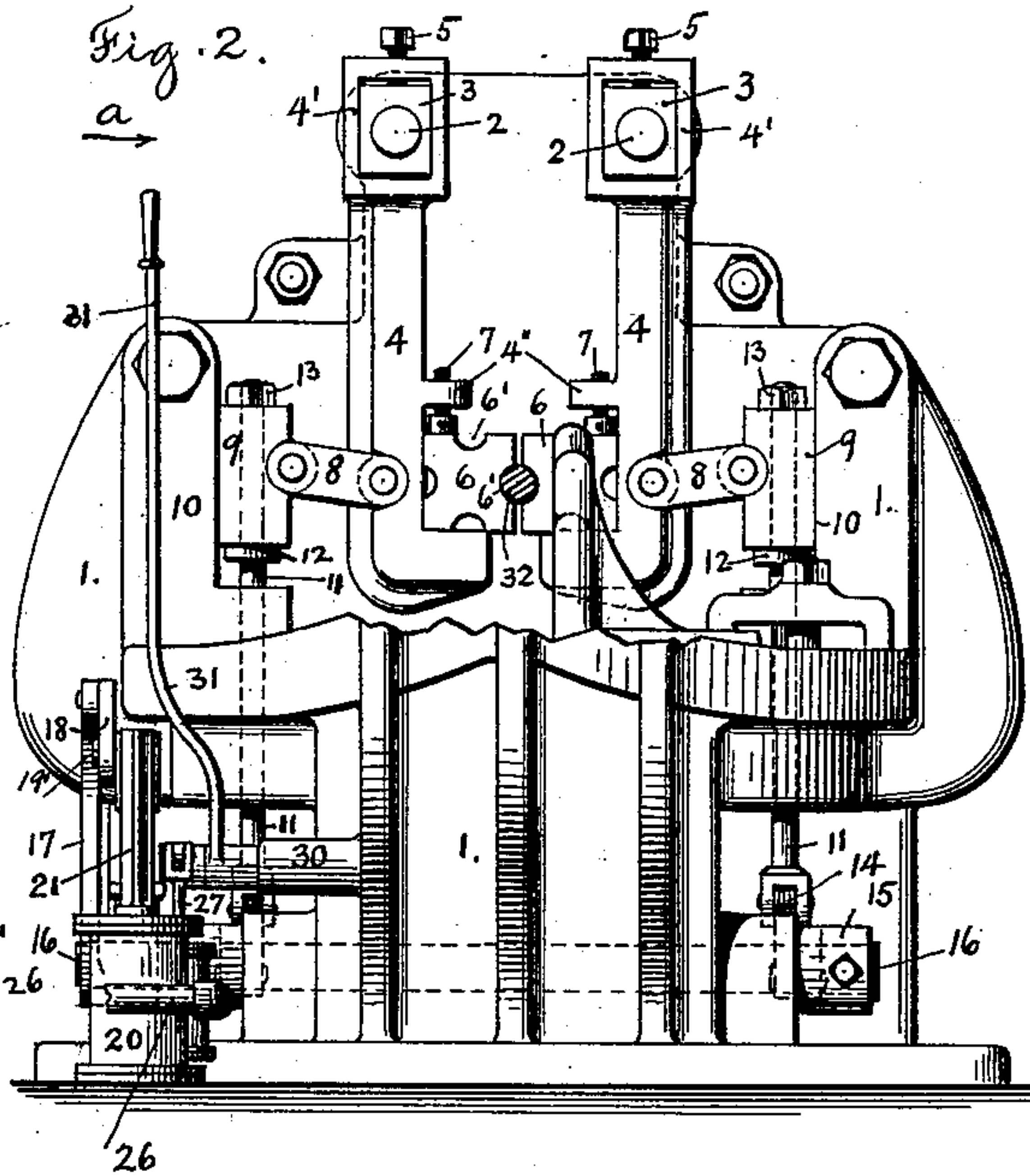
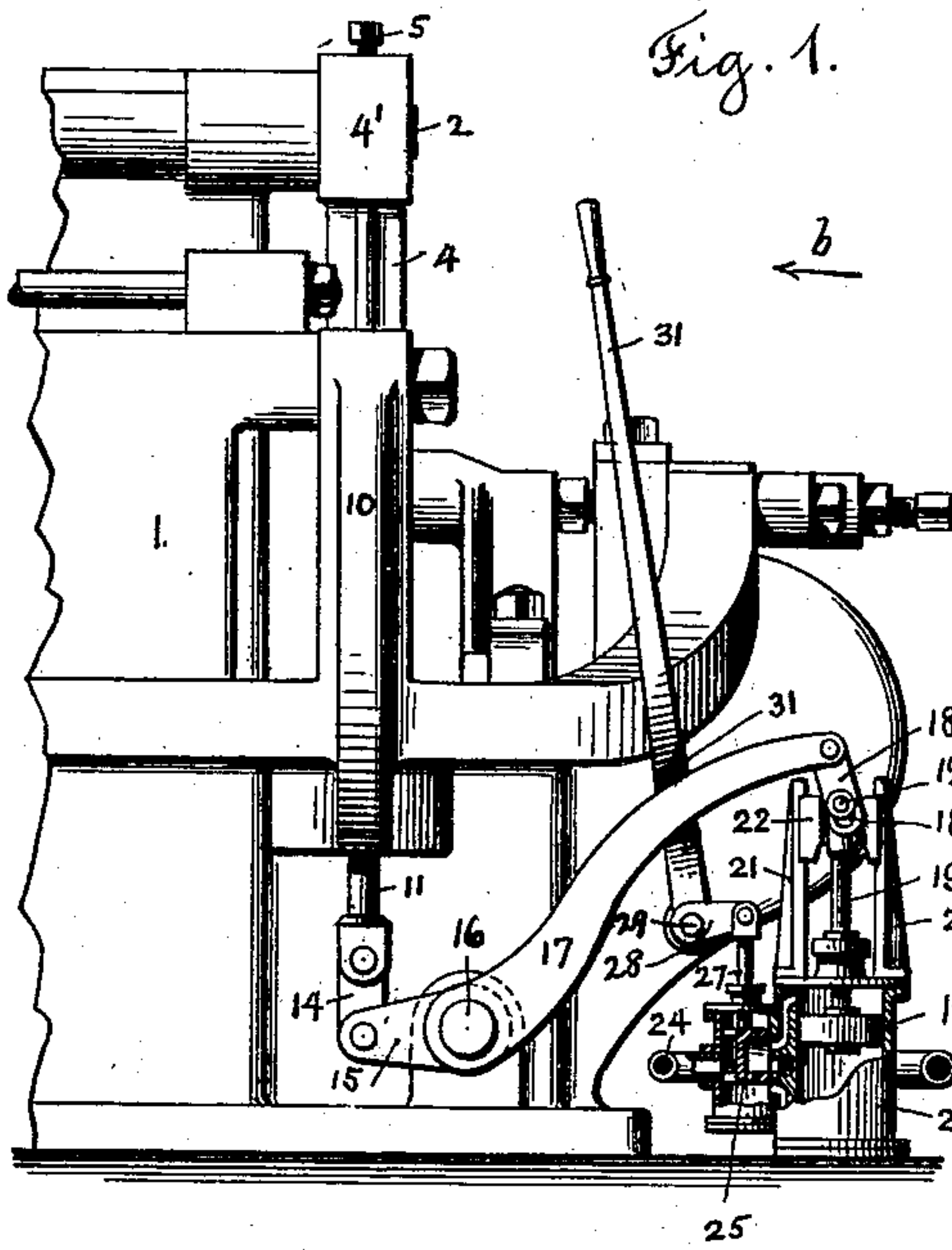
(No Model.)

2 Sheets—Sheet 1.

G. H. WEBB.
MACHINE FOR FORGING BOLTS.

No. 506,836.

Patented Oct. 17, 1893.



Witnesses
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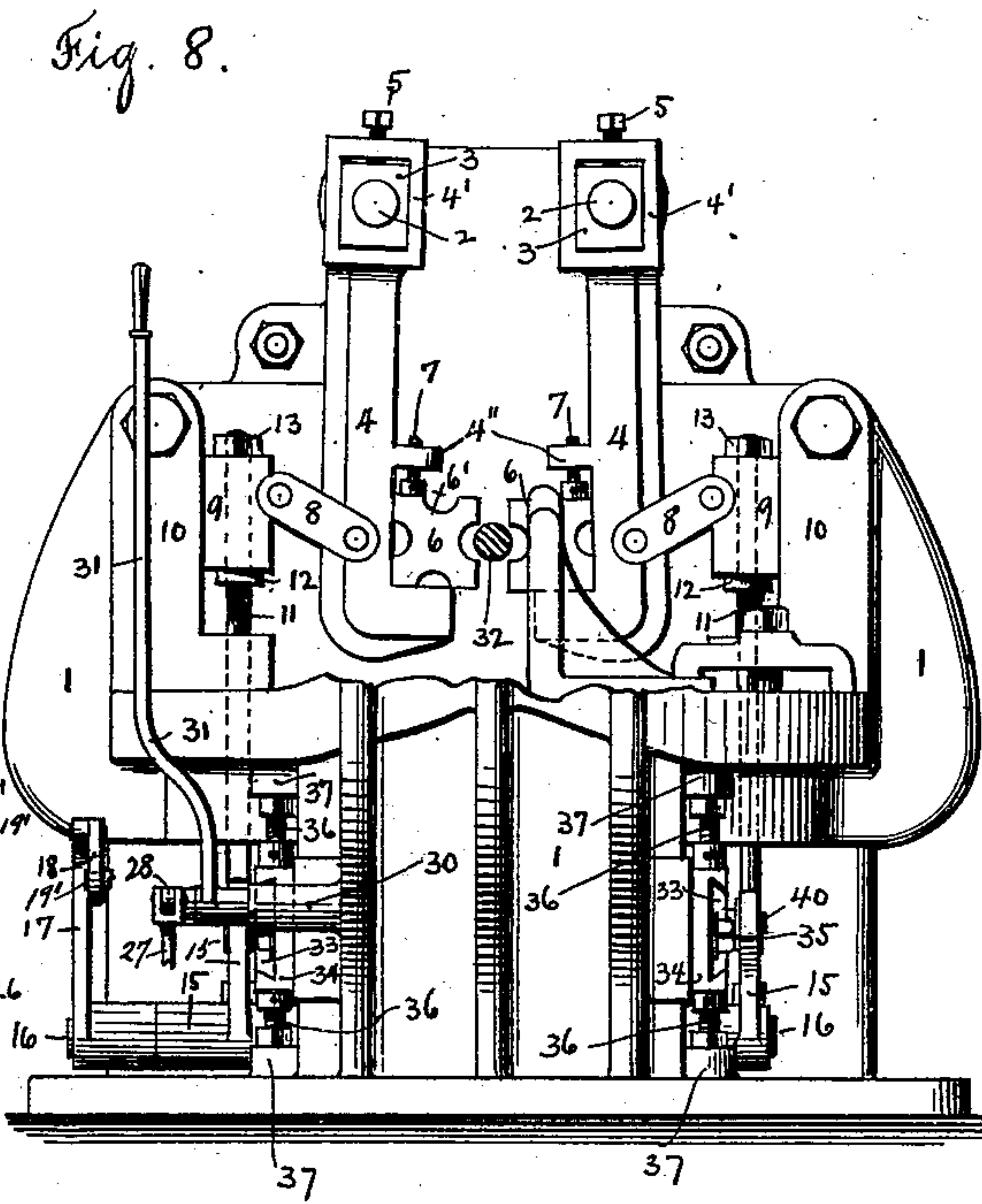
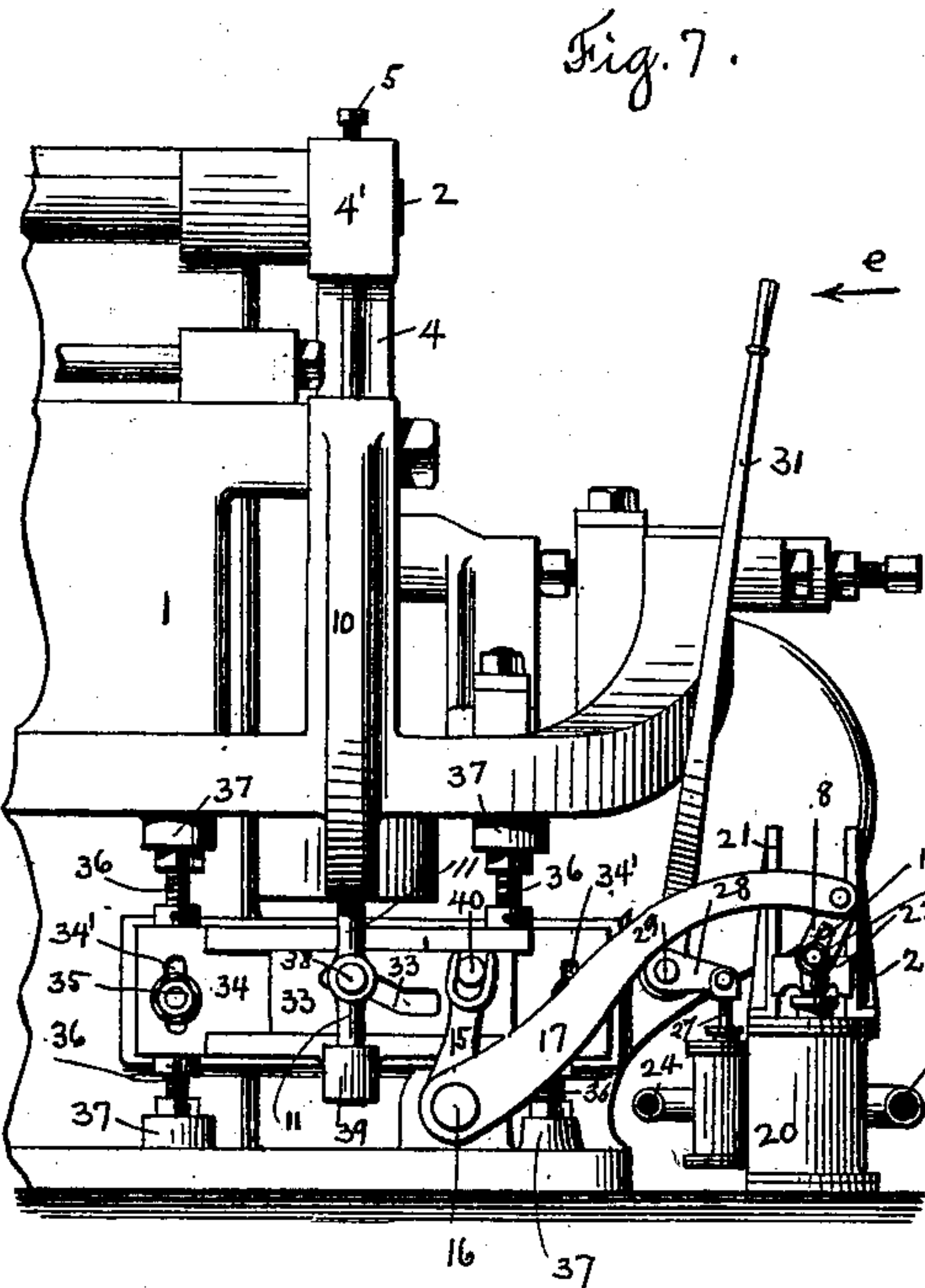
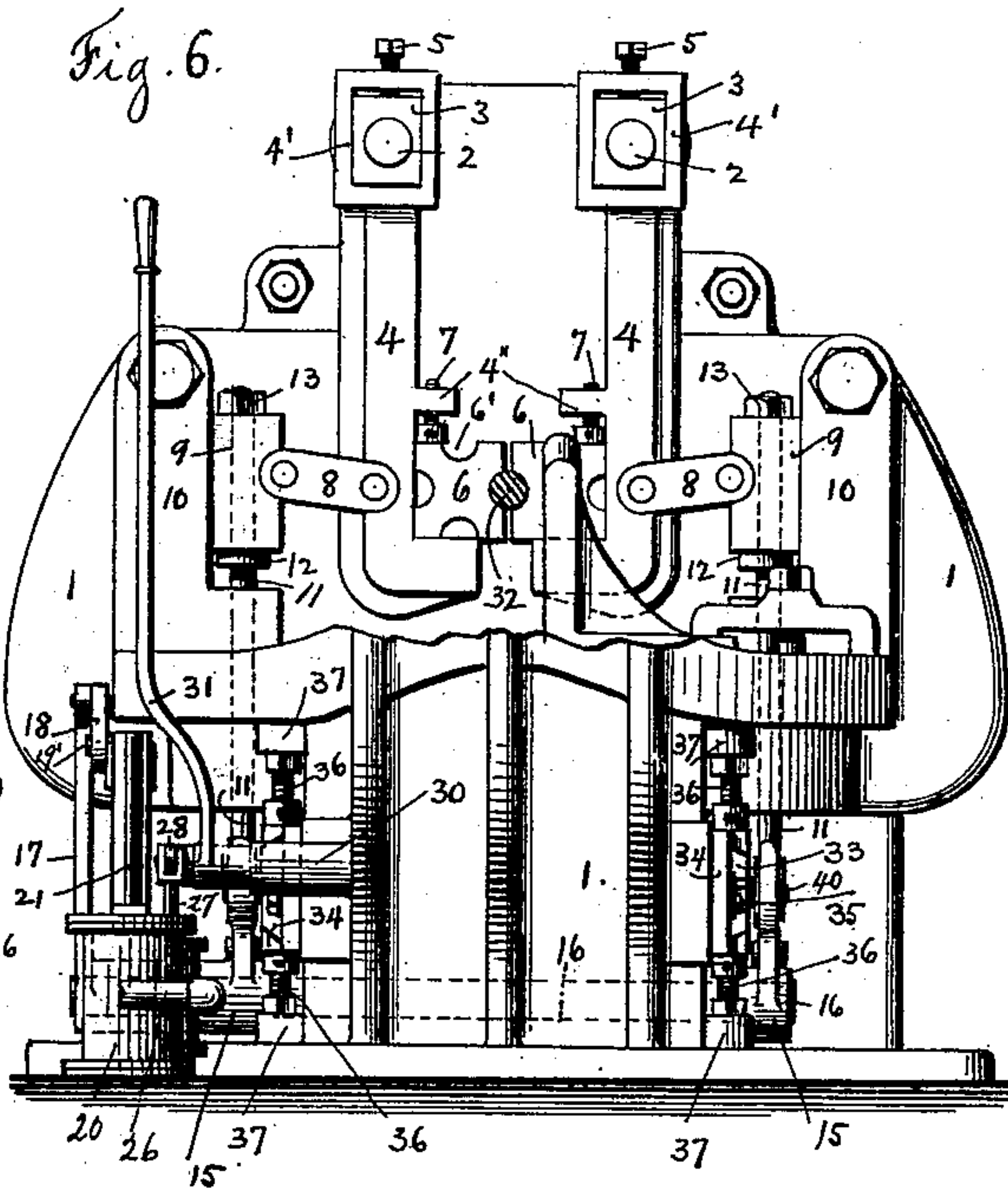
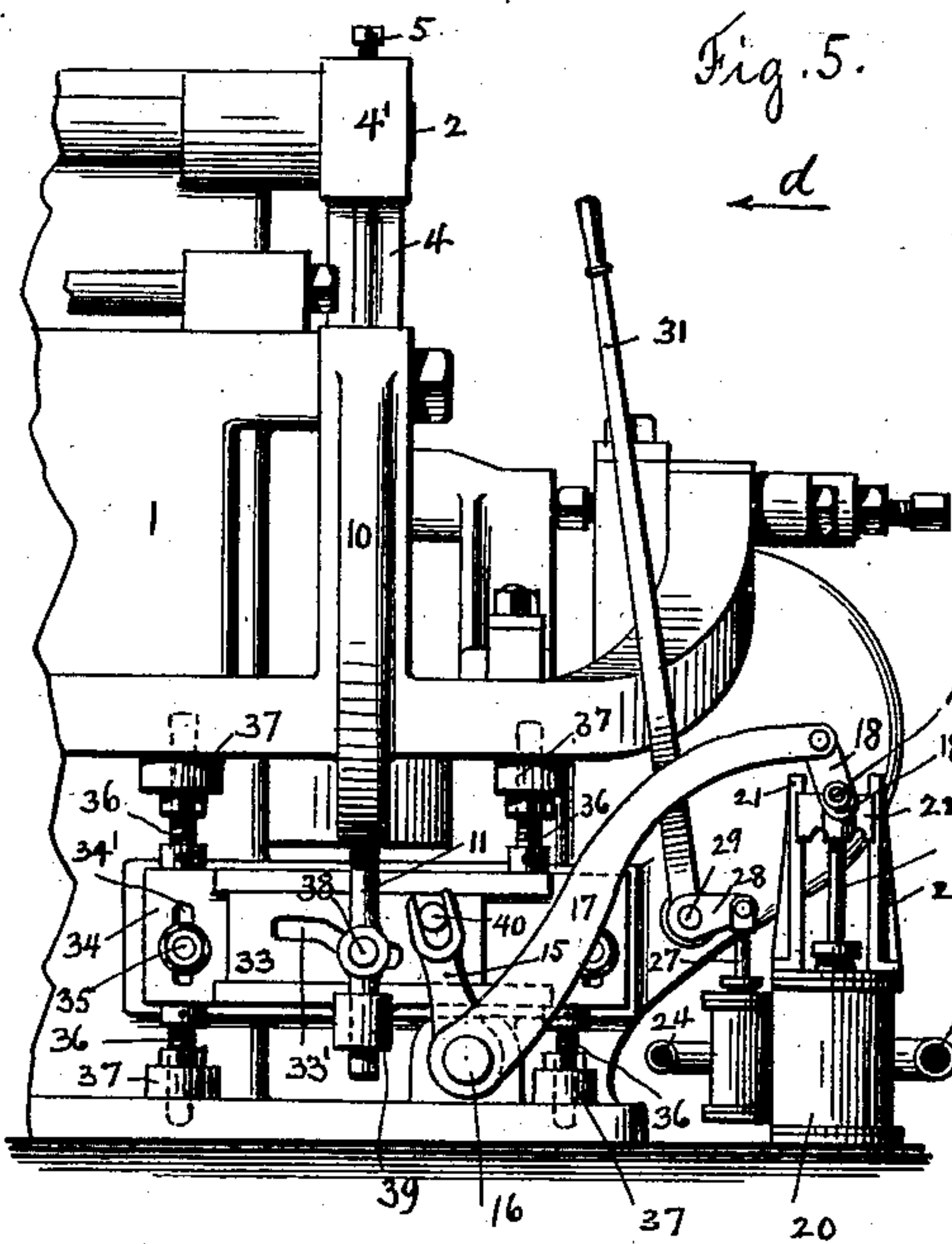
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

GEORGE H. WEBB, OF PAWTUCKET, RHODE ISLAND.

MACHINE FOR FORGING BOLTS.

SPECIFICATION forming part of Letters Patent No. 506,836, dated October 17, 1893.

Application filed December 14, 1892. Serial No. 455,137. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. WEBB, a citizen of the United States, residing at Pawtucket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Machines for Forging Bolts, &c.; and I do hereby declare that the following is a full, clear, and exact description thereof, which, in connection with the drawings making a part of this specification, will enable others skilled in the art to which my invention belongs to make and use the same.

My invention relates to machines for forging bolts, &c.

Heretofore in machines for forging bolts, &c., in which the bar or blank to be operated upon is gripped between jaws carrying dies, to be held for the upsetting dies to form the head, and in which the gripping jaws and dies have a transverse movement toward and away from each other to grip and release the blank, the operator has been obliged to use his own power to open and close the gripping jaws every time a blank is inserted and removed. The opening and closing of the gripping jaws and dies has heretofore been done by working a lever, which is directly connected, through intervening mechanism with the gripping jaws. The movement of the lever in one direction, operated by the attendant communicates a motion through the intervening connections to the gripping jaws, and causes the gripping jaws and dies to close and grip the blank to be headed, and the movement of the lever in the opposite direction causes the gripping jaws and dies to be opened and release the headed blank, so that the same may be removed, and another blank inserted. The power required to open and close the gripping jaws and dies must be applied by the attendant in operating the lever, and some additional power must be applied to overcome the friction and move the parts intervening between the lever and gripping jaws. It has been found in practice, that the constant working of the lever by the attendant, requiring sufficient power directly applied by the attendant, to open and close the gripping jaws and dies, is too severe for the ordinary attendant, and he cannot endure the hardship of working the lever, and running the ma-

chine for the ordinary working hours of a day, and this is particularly true in case of large bolt forging machines, where considerable power is required to work the lever, to open and close the gripping jaws and dies. It will be understood, that in addition to working the lever which opens and closes the gripping jaws and dies, the attendant must also work with the same hand the lever which starts and stops the machine, and with his other hand must insert and remove the blanks or bars to be forged. In working the lever which opens and closes the gripping jaws, and dies, it must be moved far enough, after the blank is inserted between the gripping dies, to cause the dies to properly grip the blank and prevent them from opening during the operation of the forging mechanism, and after the forging operation the metal having been compressed, tends to set and hold the gripping dies and requires the application of extra power to open them and release the headed blank.

The object of my invention is to do away with the necessity of the attendant working the lever to open and close the gripping jaws and dies by power applied directly to said lever by the attendant, and to open and close the gripping jaws and dies by power, independent of the power required to work said lever, and preferably by a sudden blow or jar communicated to said gripping jaws and dies, to start them, instead of a steady movement; the power to be applied preferably by the operation of a hand lever operated by the attendant, and corresponding to the lever now employed for opening and closing the gripping jaws and dies. The power used for opening and closing the gripping jaws and dies may be steam power, water power, compressed air, electricity, belt power, &c., and the mechanism for applying the power may be of any ordinary and well known construction, combined with any of the ordinary and well known machines now in general use for forging bolts, &c.

My invention consists in combining with a machine for forging bolts, &c., means for opening and closing the gripping jaws and dies by power, applied independently of the power applied by the attendant; and said power acting to open and close the gripping

jaws and dies by a sudden blow or jar communicated thereto, as will be hereinafter described.

I have shown in the drawings sufficient portions of a machine for forging bolts, &c., of well known construction and operation, with my invention combined therewith, to enable those skilled in the art to which my invention belongs, to understand the application of the same.

Referring to the drawings:—Figure 1 is a side view, looking in the direction of arrow *a*, Fig. 2, of a portion of a machine for forging bolts, &c., with my invention applied thereto. Fig. 2 is an end view, looking in the direction of arrow *b*, Fig. 1, with portions of the machine shown in Fig. 1, broken away for a more clear illustration of the parts; the gripping jaws and dies are shown closed. Fig. 3 corresponds to Fig. 1, but shows the opposite position of the mechanism for operating the gripping jaws and dies. Fig. 4 is an end view corresponding to Fig. 2, and looking in the direction of arrow *c*, Fig. 3; the gripping jaws and dies are shown open. Fig. 5 corresponds to Fig. 1, but shows a modified construction of the mechanism for operating the gripping jaws and dies. Fig. 6 is an end view, looking in the direction of arrow *d*, Fig. 5. Fig. 7 shows the opposite position of the mechanism for operating the gripping jaws and dies shown in Fig. 5, and Fig. 8 is an end view looking in the direction of arrow *e*, Fig. 7.

I have shown in the drawings portions of a machine for forging bolts, &c., of well known construction and operation, and of the type shown in the Burdick United States patent, No. 97,351, to which reference is hereby made for a detailed description of the construction and operation of the machine.

In the machine shown in the drawings, the blank or bar to be forged is held by the gripping jaws and dies, and acted on by the forging dies, and the upsetting die or plunger, not shown, and which correspond to the forging dies, and upsetting die, shown and described in the patent above referred to.

In the accompanying drawings, 1 is the frame of the machine, in the upper portion of which are secured the two studs 2, on the outer ends of which are mounted the blocks 3 upon which are secured the straps 4' of the gripping jaws 4; adjusting screws 5 are tapped through the upper side of the straps 4' with their lower ends bearing on the upper surface of the blocks 3. The screws 5 serve to secure the straps 4' of the gripping jaws 4 to the blocks 3, and also provide for the vertical adjustment of said jaws. In the lower ends of the gripping jaws are supported the gripping dies 6, provided with circular depressions 6' therein to receive the blank or bar 32 to be forged; said dies 6 are retained in place in the gripping jaws, in this instance by clamping screws 7 tapped through ears 4'' on the gripping jaws 4, with their heads bearing on the top surface of the gripping dies 6.

The gripping jaws 4, carrying the gripping dies 6, are swung on their pivot points to close and open, and grip and release the blank or bar to be forged, in this instance through a toggle joint, consisting of a link 8, and a vertical moving slide 9, supported and adapted to have a reciprocating motion in ways formed on the stands 10 secured to, or made integral with the frame 1.

The slides 9 are operated by vertical moving rods 11, having their bearing in the frame 1, and attached at their upper ends to the slides 9, in this instance by extending through said slides, which rest on a collar 12 on said rods, and are secured thereto by a nut 13. The rods 11 are attached at their lower ends, through links 14, to the arms 15 fast on the rock shaft 16, mounted in bearings in the lower portion of the frame.

The rock shaft 16 is ordinarily operated by a lever attached thereto, which lever is moved back and forth by the attendant, to close and open the gripping jaws and dies, through the intervening mechanism.

In my present invention, the lever operated by the attendant, is not attached to the shaft 16, but said shaft is operated to close and open the gripping jaws and dies, through the intervening mechanism, by power applied independently of the power applied by the attendant to move the lever which controls said power.

In Figs. 1, 2, 3, and 4, I have shown the operating lever 17 secured at one end on the rock shaft 16, and connected at its other end by a link 18 with the piston rod 19, of a steam, water, or compressed air cylinder 20. The link 18 has a slot 18' in its lower end which is connected with the upper end of the piston rod 19 by a pin 19'. The object of the slot 18' is to cause the piston 19'', at the beginning of its stroke, to give a sudden blow or jar, which is communicated, through the intervening mechanism, to the gripping jaws and dies, to start to open and close them, by a sudden blow or jar, instead of a steady movement. I have found in practice, that the gripping jaws and dies are apt to become set, by the upsetting or heading of the bolt, and that a sudden blow or jar communicated to them at the beginning of the operation of their opening and closing is a great advantage, as a sudden blow acts to start them and to open and close them more quickly, and with less power than a steady movement.

The cylinder 20, and operating valve mechanism may be of any ordinary construction and operation.

I have shown in the drawings the cylinder 20 placed on the floor at the rear right hand side of the machine, and provided with guides 21 on the top thereof, for the cross head 22 of the piston rod 19. The piston 19'' is acted on by steam, water, or compressed air passing through the supply pipe 24, and controlled by the valve 25, of any ordinary construction, as shown in Fig. 1. 26 is the exhaust pipe.

The valve stem 27 is attached at its upper end to an arm 28 fast on a spindle 29, which has its bearings in a hub 30 on the frame 1. The lower end of the hand lever 31 is also fast on said spindle 29, and said hand lever 31 is moved back and forth by the attendant to operate the valve, and cause the steam, water, or compressed air to act on the piston, which operates the lever 17, and through the intervening mechanism, closes and opens the gripping jaws and dies.

I have shown in Figs. 5, 6, 7, and 8, a modified construction of the mechanism for operating the vertical moving rods and slides, which open and close the gripping jaws. In said modified construction, a cam slide 33 is interposed between the arm 15 fast on the rock shaft 16 and the vertical moving rod 11. The cam slides 33 are supported and move in ways on a plate 34, adjustably secured to the outside of the frame 1 by means of bolts 35, extending through slots 34' in said plate at each end thereof; said plate 34 is adapted to be adjusted vertically on the frame 1, by means of adjusting screws 36 screwed into hubs 37 above and below the plate 34, with their heads adapted to bear on the edges of the plate, as shown in Figs. 5 and 8. The slides 33 have a cam groove 33' therein, adapted to receive a roll loosely held on a stud 38, secured in the lower end of the vertically moving rods 11, and the lower ends of said rods 11 may have a bearing in hubs 39 on the frame. The cam slides 33 also have a pin 40 secured therein, which extends into the bifurcated end of the arm 15 fast on the shaft 16.

The moving of the rock shaft 16, through the arms 15, causes the cam slides 33 to move, and raise and lower the rods 11, through the stud 38 traveling in the cam groove 33' in said slides. When the stud is in the lower straight portion of the cam groove 33', as shown in Fig. 5, the gripping jaws 4 and dies 6 will be closed, and will be locked or held in their closed position as shown in Fig. 6; and when the stud 38 is in the upper straight portion of the cam groove 33', the jaws 4 and dies 6 will be opened and held open, as shown in Fig. 8.

The particular object of the cam slides 33 is to hold the gripping jaws and dies closed, after the operating lever has been moved to close the jaws, so as to prevent the opening of the jaws during the operation of the forging dies, in case the operating lever has not been moved quite far enough.

The cam slides 33 are designed to be used where the power which operates the lever to rock the shaft 16, is shut off after it has operated the lever, as in the case of electricity used as a power.

In the case of steam, water, or compressed air, used as the power to operate the lever to rock the shaft 16, it would not be necessary to shut off said power, and therefore said power itself would act to keep the gripping

jaws and dies closed, during the forging operation, and the cam slides 33 would not be required.

The operation of the mechanism above described will be readily understood by those skilled in the art, from the above description, in connection with the drawings. Supposing the gripping jaws and dies to be closed, as shown in Fig. 2, the operating lever 17, the piston 19', and piston rod 19 will be in the position shown in Fig. 1, with the hand lever 31 moved in toward the machine; after the forging dies have operated on the bar 32, the attendant grasps the lever 31, and draws it back into the position shown in Fig. 3, operating the valve 25, and causing the piston to be moved down in the cylinder 20, and the operating lever 17 to rock the shaft 16 and move the rods 11 and slides 9 to open the gripping jaws 4 and dies 6, as shown in Fig. 4. The attendant not being required to use his strength to open and close the gripping jaws and dies, can do a great deal more work during a working day on the machine, and can turn out a much greater product, than has been possible heretofore on machines in which the attendant has been obliged to work the lever, which operates the mechanism which opens and closes the gripping jaws and dies, and further, boys and even girls can run the heaviest machine for forging bolts, &c., provided with my power attachment. It will thus be seen that the attendant only has to move the lever 31, which works the valve that controls the power which operated the lever 17, and through intervening mechanism closes and opens the gripping jaws and dies, and that the power required to close and open the gripping jaws and dies is applied independently of the power applied by the attendant to move the lever 31. A second hand lever, not shown, extends alongside of the hand lever 31, and is moved by the attendant to start and stop the machinery which operates the forging dies, the operation of which is independent of the operation of the gripping jaws and dies.

It will be understood that in carrying out my invention I do not limit myself to any particular machine for forging bolts, &c., nor the particular means shown and described for applying the power to operate the gripping jaws and dies, as any other well known means may be employed.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for forging bolts, &c., the combination with gripping jaws and dies, of mechanism for opening and closing said gripping jaws and dies, and communicating a sudden blow or jar to the same, to start them in the operation of opening and closing, said mechanism operated by power controlled by a lever operated by the attendant, said power being independent of the power applied by the attendant in working said lever, for the purpose stated, substantially as set forth.

2. In a machine for forging bolts, &c., the combination with movable gripping jaws and dies, for holding the bolt to be forged, arranged upon opposite sides of said bolt, and
5 both gripping jaws and dies adapted to be moved toward and away from the bolt, of mechanism for operating said gripping jaws and dies, and communicating a sudden blow or jar to the same, to start them in the opera-
10 tion of opening and closing, said mechanism operated by power, for the purpose stated, substantially as set forth.

3. In a machine for forging bolts, &c., the combination with the gripping jaws and dies,
15 of mechanism for operating said gripping jaws and dies, consisting of vertical moving slides, connected with said gripping jaws, vertical moving rods, connections to a rock shaft, and said rock shaft, and an operating lever
20 fast on said shaft, said lever operated by power controlled by a lever operated by the attendant, substantially as set forth.

4. In a machine for forging bolts, &c., the combination with the gripping jaws and dies,
25 of mechanism for operating said gripping jaws and dies, consisting of vertical moving slides connected with said gripping jaws, vertical moving rods, connections to a rock shaft, and said rock shaft, and an operating lever
30 fast on said shaft, a link connected with said operating lever, having a slot therein which

is connected with the cross head of the piston rod, for the purpose stated, substantially as set forth.

5. In a machine for forging bolts, &c., the combination with gripping jaws and dies, of mechanism for opening and closing said gripping jaws and dies, operated by power, said mechanism having a cam slide, for the purpose stated, interposed between the operating lever, to which power is applied, and the vertical moving rods which act to open and close the gripping jaws and dies, substantially as set forth.

6. In a machine for forging bolts, &c., the combination with gripping jaws and dies, of mechanism for opening and closing said gripping jaws and dies, operated by power, said mechanism having a cam slide interposed between the operating lever to which power is applied, and the vertical moving rods which open and close the gripping jaws and dies, said slide mounted in ways adjustably secured to the frame of the machine, and provided with a cam groove in which a stud or roll on the vertical moving rods travels, for the purpose stated, substantially as shown and described.

GEORGE H. WEBB.

Witnesses:

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