

2 Sheets—Sheet 1.

No. 493,874.

Patented Mar. 21, 1893.

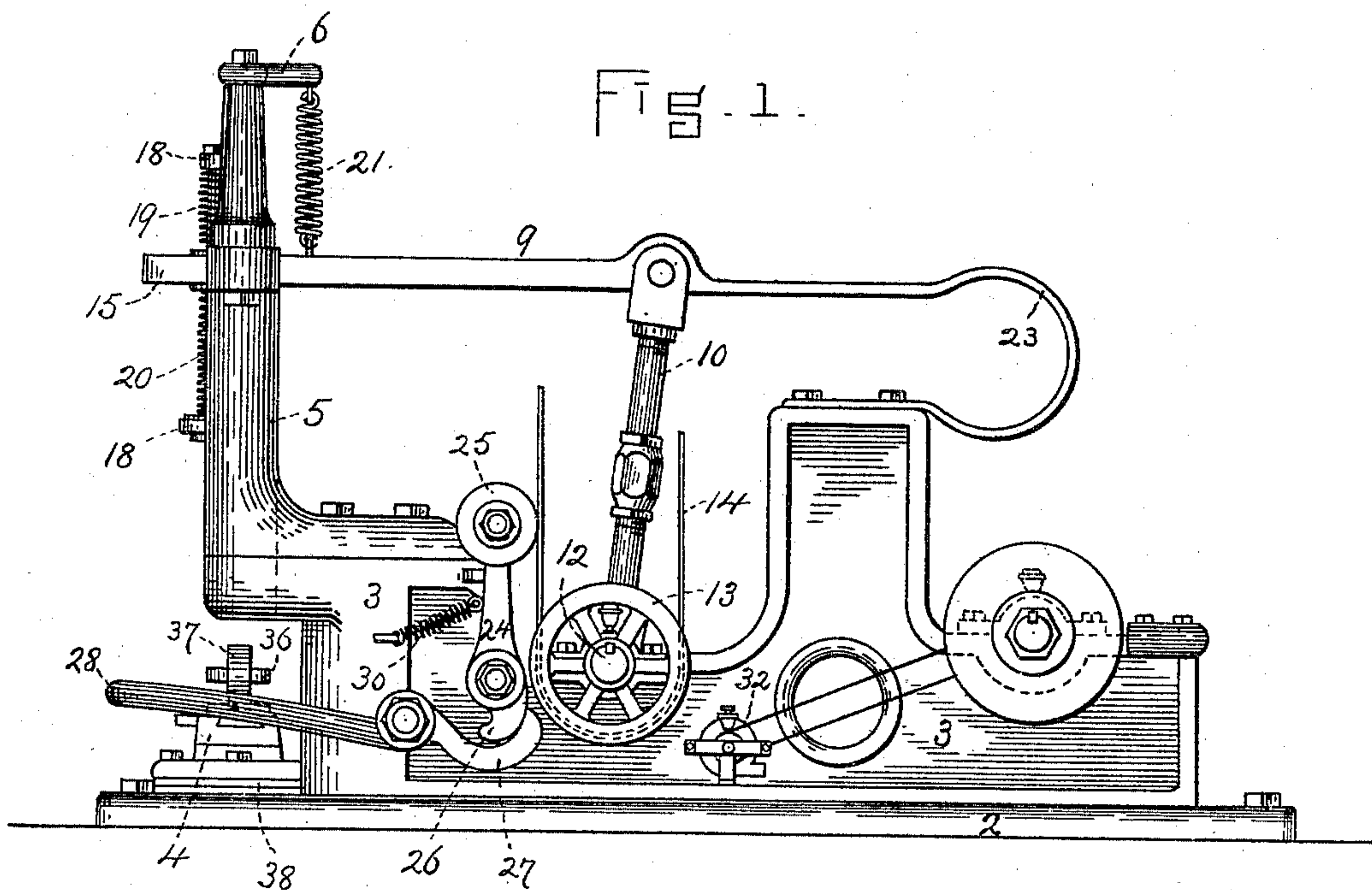
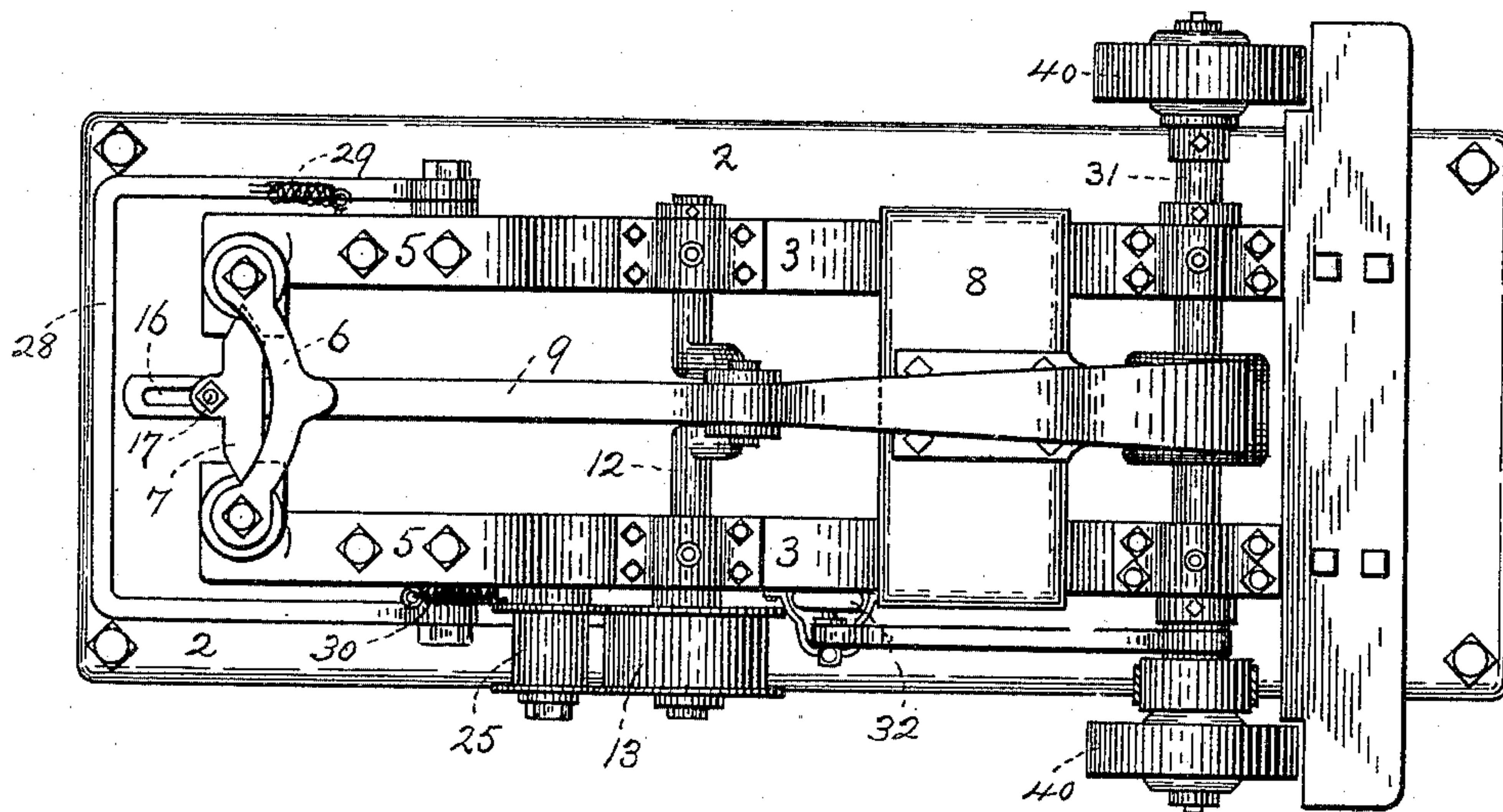


Fig. 2.



WITNESSES.

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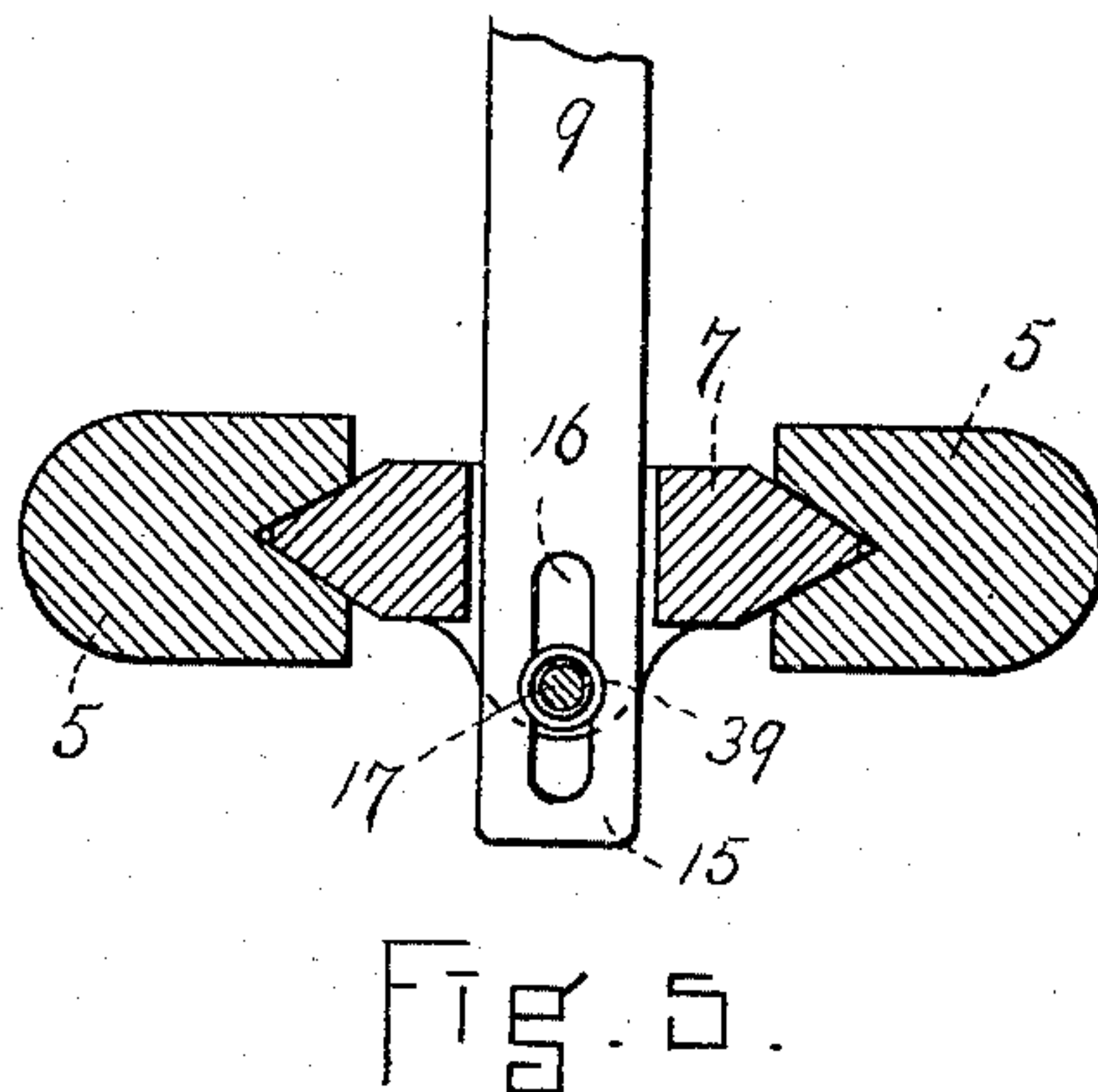
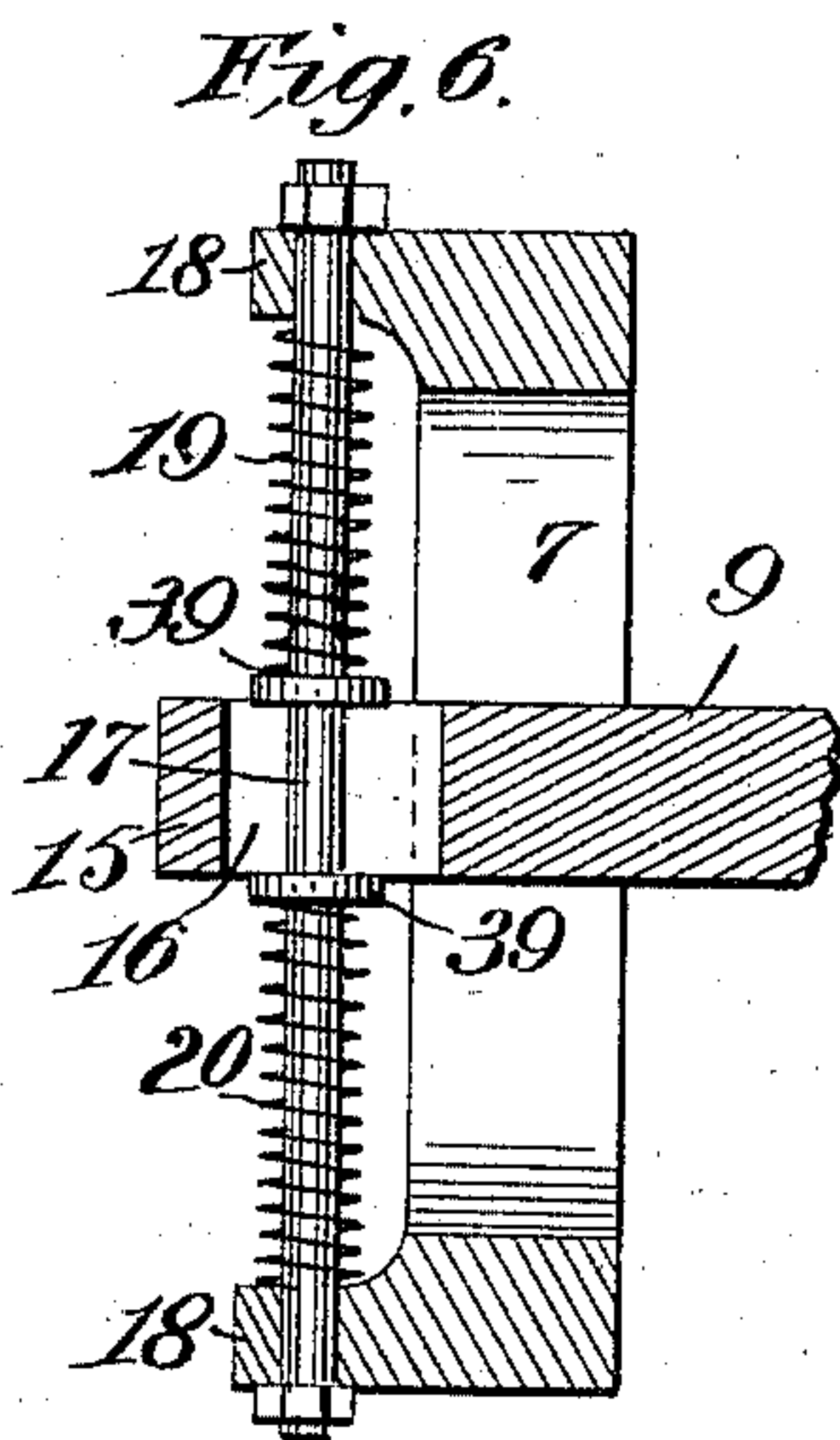
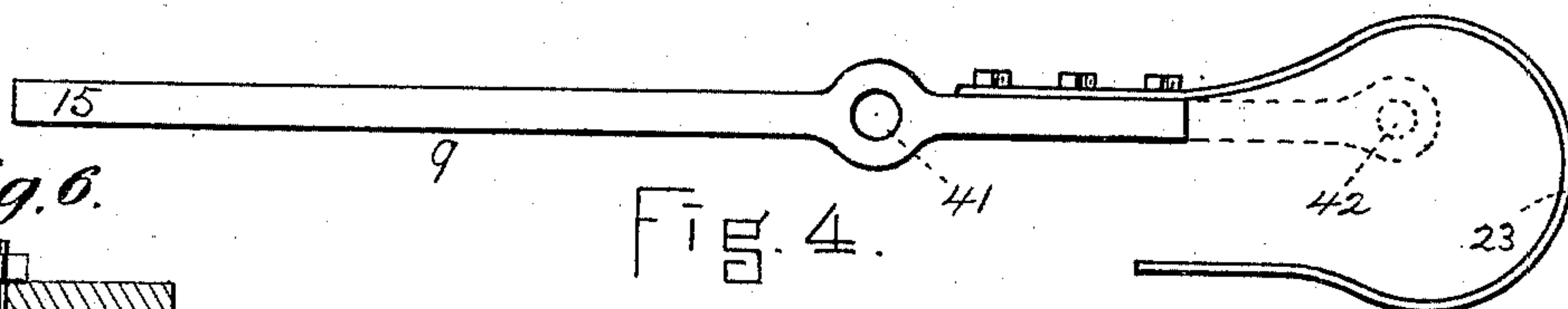
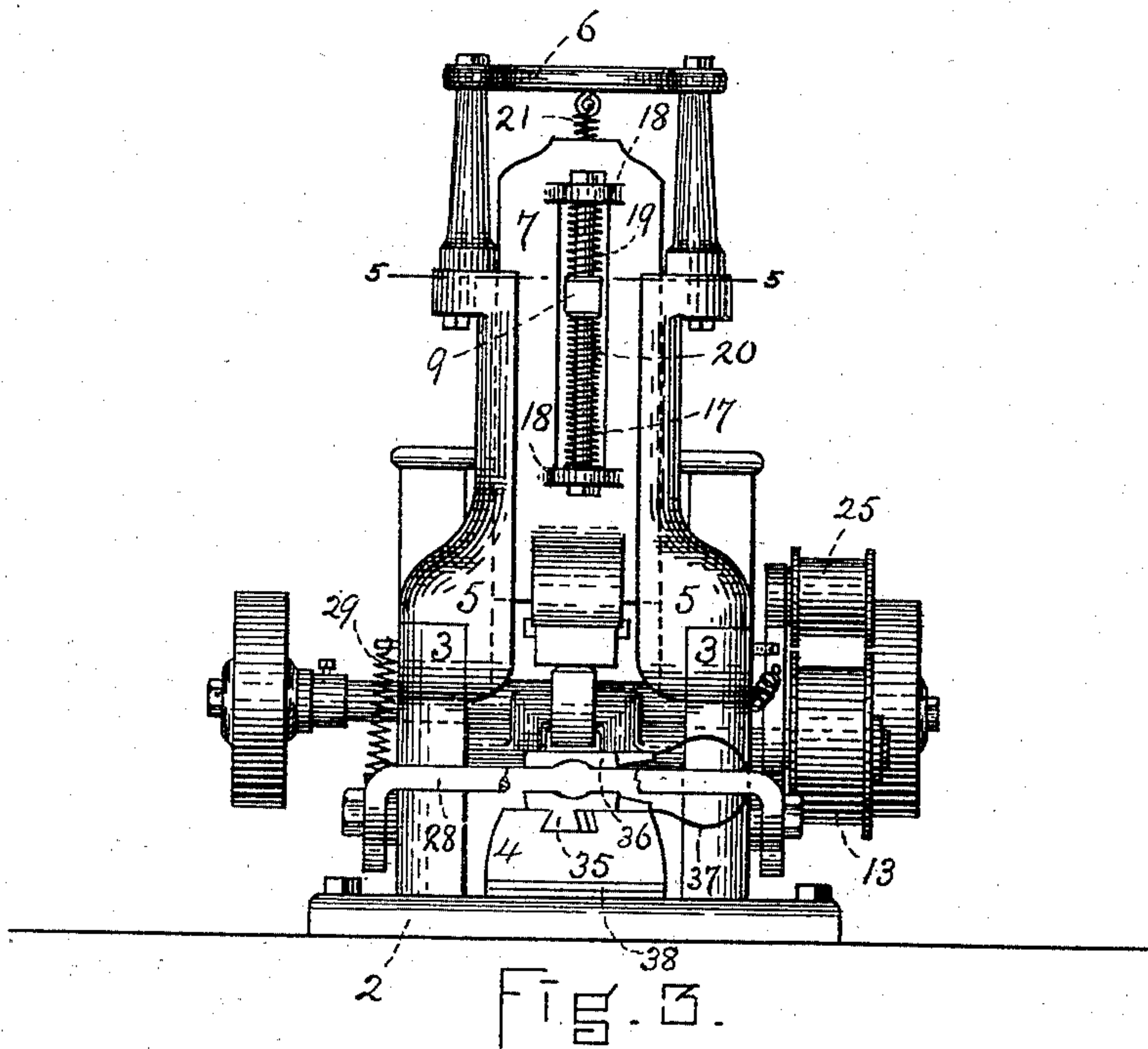
(No Model.)

2 Sheets—Sheet 2.

J. O'BRIEN.  
POWER HAMMER.

No. 493,874.

Patented Mar. 21, 1893.



WITNESSES.

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# UNITED STATES PATENT OFFICE.

JOSEPH O'BRIEN, OF BOSTON, MASSACHUSETTS.

## POWER-HAMMER.

SPECIFICATION forming part of Letters Patent No. 493,874, dated March 21, 1893.

Application filed February 5, 1892. Serial No. 420,398. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH O'BRIEN, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Power-Hammers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

15 This invention relates to power-hammers, so called, and pertains to improvements in the peculiar manner of mounting the hammer, as likewise to the mechanism by which the action of the machine is controlled, so that it may be stopped, and started, and when in action enables a heavy or light blow to be delivered.

My invention consists primarily in providing a self-balanced spring-actuated hammer 25 which is mounted in standards or uprights, and loosely attached to the free end of an oscillating helve or bar, the springs being positioned above and below said helve in order to allow the amplitude of the oscillations of the helve to exceed the travel of the hammer, and thus allows for the varying thicknesses of metal operated upon.

The drawings accompanying this specification represent in Figure 1 a side elevation. 35 Fig. 2 is a plan; Fig. 3. an end elevation of a power hammer embodying my invention. Fig. 4 is a modified form of helve. Fig. 5 is a horizontal cross-section through the hammer and the guides. Fig. 6 is a detail side view of the rod and springs with the hammer-helve in vertical section.

In the operation of power-hammers it has been found that a blow, imparted by some elastic medium, which thereby causes the hammer to strike the object quickly and then leave it, possesses peculiar properties, chief among which is that the metal treated retains its heat for a longer time than when subjected to a dead blow.

50 The object of my present improvements is to obtain an elastic blow.

In the drawings I have shown a bed-plate 2 provided with twin uprights 3, 3, upon which are mounted the several elements comprising the power hammer as an entirety. At the front end of the bed-plate is situated the anvil 4, while removably secured upon this end of the housings 3, 3, are similar guide posts 5 united at the top by a tie-rod 6; within these guide-posts is fitted the hammer 7 which is adapted to reciprocate in vertical paths. Upon and near the rear end of the housings rise abutments, which are capped with a plate 8 to which is bolted the fixed end of a spring helve 9. This latter is adapted to operate the hammer and is oscillated by means of a connecting rod 10 and crank-shaft 12 journaled transversely in the housings 3, 3. Said connecting rod is fitted with a right and left screw-threaded nut in order to render the length of the rod variable and so control the stroke. The crank-shaft is fitted with a pulley 13 and driving belt loosely thereabout to some prime motor.

A prominent feature in this machine consists in the manner of mounting and operating the hammer; in many instances in this type of machine the hammer is rigidly affixed to the helve, while the latter is spring-actuated. In the present instance this hammer is loosely attached to the free end of the helve and in the following manner. This free end 15 of the helve is slotted vertically at 16 and receives a rod 17 which plays loosely therein; moreover the hammer is apertured to allow the free end of the helve to pass therethrough. Lateral ears or offsets 18 are cast upon the hammer head at each end and receive the extremities of the rod 17, while encircling said rod are placed two coiled springs 19, 20, respectively upper and lower; said springs rest upon washers 39 which serve as bearings against the helve while the opposite bearings are supplied by the said ears 18. Thus it is evident that the hammer has a certain freedom of movement independent of the oscillations of the helve, which would otherwise occur if the latter and the hammer were rigidly united. Furthermore it will be noticed, that the helve supports and actuates the hammer, yet although said helve is a rigid bar at its free end, by my method of mount-



ing the hammer a powerful and elastic blow may be imparted. To compel return of the helve to its normal raised position, and to prevent a dead center upon the crank-shaft, I have flattened the fixed end of said helve and made a plate spring 23 thereof; to increase the action of the said helve, a coiled spring 21 is located at the free end and attached to the tie rod 6. In lieu of making the helve in one piece, as in Fig. 1, a modified construction may be employed by making the spring portion 23 separate from the main part which consists of a rigid bar. This latter construction simplifies the cost of manufacture.

To produce proper tension on the loose belt 14 about the pulley 13 I have provided a belt-tightener in the shape of a rocker-arm 24, pivoted to the side of one of the housings and equipped with a loose drum 25 adapted to contact against the belt. The lower end of said lever is formed with a cam 26 and engages a similarly formed extension 27, making part of a foot-lever 28 which spans the front end of the machine to which it is pivoted; this form is to enable the operator to work in various positions at the anvil and yet have full control of the hammer. A spring 29 acts to hold the lever 28 in an upraised position, while a spring 10 serves a similar purpose with respect to the rocker arm 24 and prevents the latter from touching the belt, except at proper times. The foot lever is shown depressed and with the drum 25 in contact with the belt. The above described parts are positive in their action, and no lost motion occurs, a great objective in the operation of this class of machines where the strength of the blow should always be under full control.

The operation of the hammer is as follows, it being understood that the rod 17 is free to move through the end of the helve as well as lengthwise of the slot 16 to compensate for the right line movement of the hammer and the oscillating motion of the helve. Rotation of the crank-shaft causes oscillations of the helve, these oscillations vary in rapidity depending upon the length of the connecting rod, while the power of the blow depends upon the tension of the belt 14; such tension being varied by the operator at will through the agency of the foot-lever 28, its extension 27 and the rocker-arm 24. When a downward oscillation of the helve occurs the hammer drops quickly therethrough, until it meets the object under treatment, at this time the limit of the oscillation of said helve has not been reached, as a result the lower spring 20 is compressed and the effect of the blow is intensified as the two acts are almost simultaneous. Immediately upon the beginning of an upward oscillation the lower spring under compression and the upper spring 21 under tension serve to accelerate the movement of the hammer; for a moment such travel exceeds that of the helve. In this manner a very quick springy blow follows the oscilla-

tion of the helve, which act may be continued successively as with ordinary hammers of this class. By mounting the hammer loosely upon the end of the helve this latter may be made rigid and the amplitude of the oscillations be made to exceed the throw of the hammer by means of the spring mediums employed above and below the helve. Thus not only is the blow elastic but the hammer remains in contact with the metal for the shortest space of time requisite to produce the desired effect. By lengthening the oscillations of the helve and thereby increasing the compression of the lower spring 20 the effect of the blow may be intensified. In connection with this hammer and co-operating therewith is the anvil 4 placed upon a cushion 38 and fitted with a removable face-block 35, the latter is secured in position by a wedge or key and in the present instance acts as a matrix in connection with a similar casting 36, as a die. This latter is adjusted above the anvil proper and united with a matrix by a plate spring 37, which holds it in position to allow of insertion or withdrawal of the metal in process. This form of face-block is peculiarly adapted to drop forge work.

This hammer is equipped with a counter-shaft 31 supplied with emery wheels 40 and also with a blower 32, whereby a forge can be supplied with a forced blast; thus tools in process may be ground and finished on the same machine.

I do not desire to be confined in my invention to a spring helve as it is evident that a rigid helve may be employed and constructed as shown in Fig. 3, viz: with the crank connection made at 41 and the fixed end to be secured at 42, the rear end of the helve being shown by the dotted lines as extended to bring the connecting rod about centrally thereof.

What I claim is—

1. In a power-hammer, the combination with a suitable standard, its guides, and an oscillating helve slotted at its free end, of an apertured hammer-head adapted to reciprocate vertically in said guides and loosely of the helve, which projects therethrough, a rod rigidly secured in said hammer-head but extending loosely through the helve slot, and springs mounted on said rod upon opposite sides of the helve, all operating substantially as set forth.

2. In a combination with a standard having suitable guides, a helve movably secured to said standard and slotted longitudinally at its free end, a rod extending loosely through the helve slot, an apertured hammer-head reciprocating in said guides and having no positive connection with the helve, which moves freely in said aperture, spring mediums upon said rod on opposite sides of the helve, and means for oscillating the helve, composed of a rotary crank-shaft, and a connecting rod to the helve, substantially as stated.

3. In a power-hammer a suitable standard,



the guides thereon, a spring-actuated helve  
slotted at its free end and secured to the  
standard by the spring 23, a rotary crank  
shaft, and connecting rod to oscillate said  
5 helve, combined with an apertured hammer-  
head mounted in said guides, springs inter-  
posed between the ends of the hammer-head  
and opposite sides of the helve, a rod to hold  
said springs in place and extending loosely  
10 through the slotted end of the helve, and the

balance spring 21 interconnecting the free  
end of the helve with the standard, substan-  
tially as and for purposes explained.

In testimony whereof I affix my signature in  
presence of two witnesses.

JOSEPH O'BRIEN.

Witnesses:

H. E. LODGE,

E. K. BOYNTON.