(No Model.)

5 Sheets—Sheet 1.

S. D. TUCKER.

Printing Machine.

No. 241,168. Patented May 10, 1881.

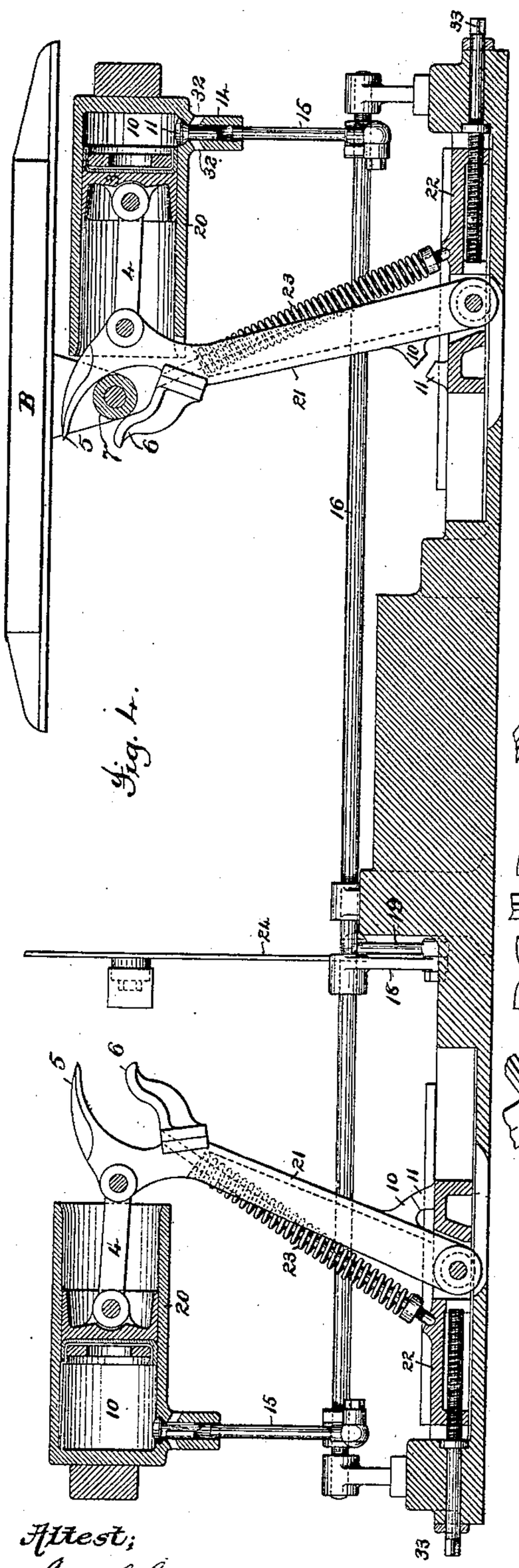

Fig. 2.

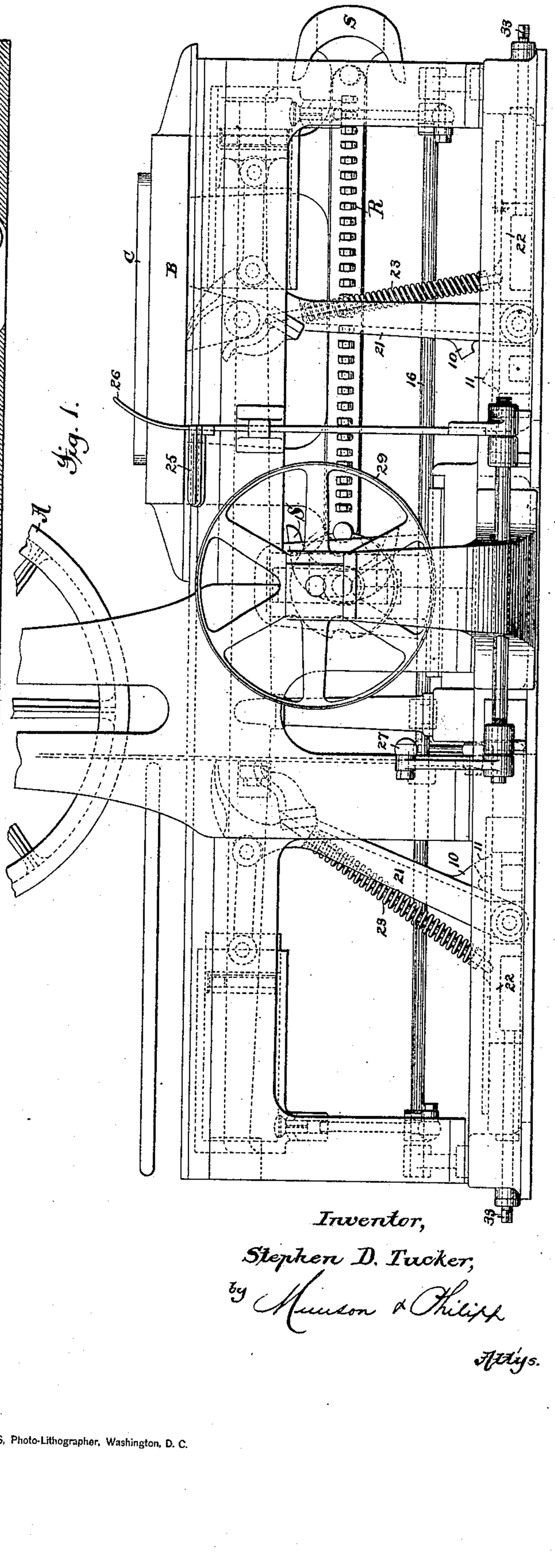

Fig. 1.

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T. H. Palmer

Inventor,

Stephen D. Tucker,

by Munson & Philipp

Attys.

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S. D. TUCKER.

Printing Machine.

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Fig 11.

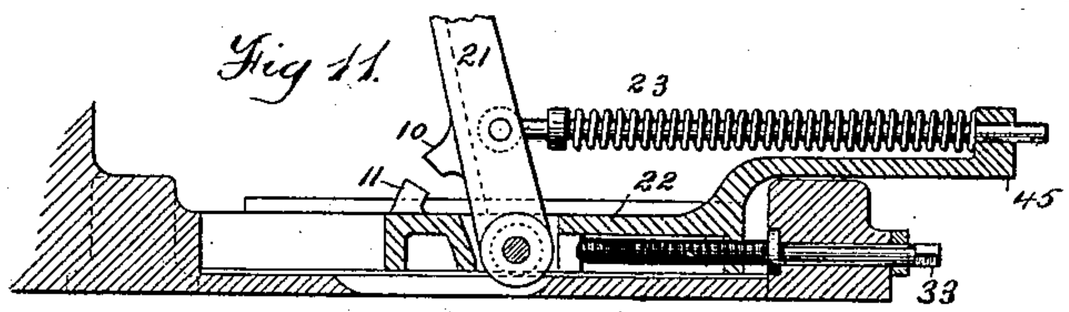

Fig. 2.

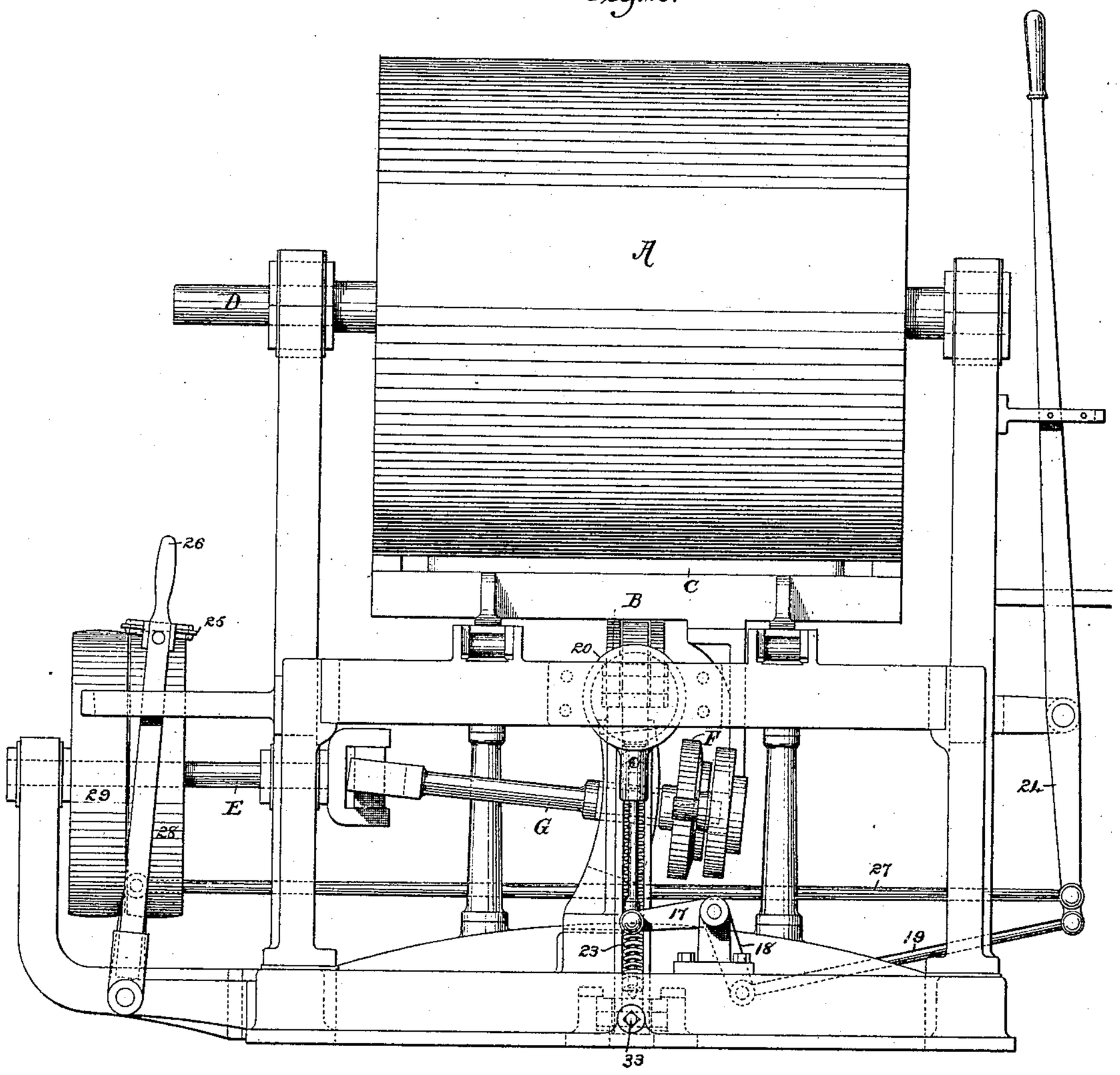

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Fig. 3.

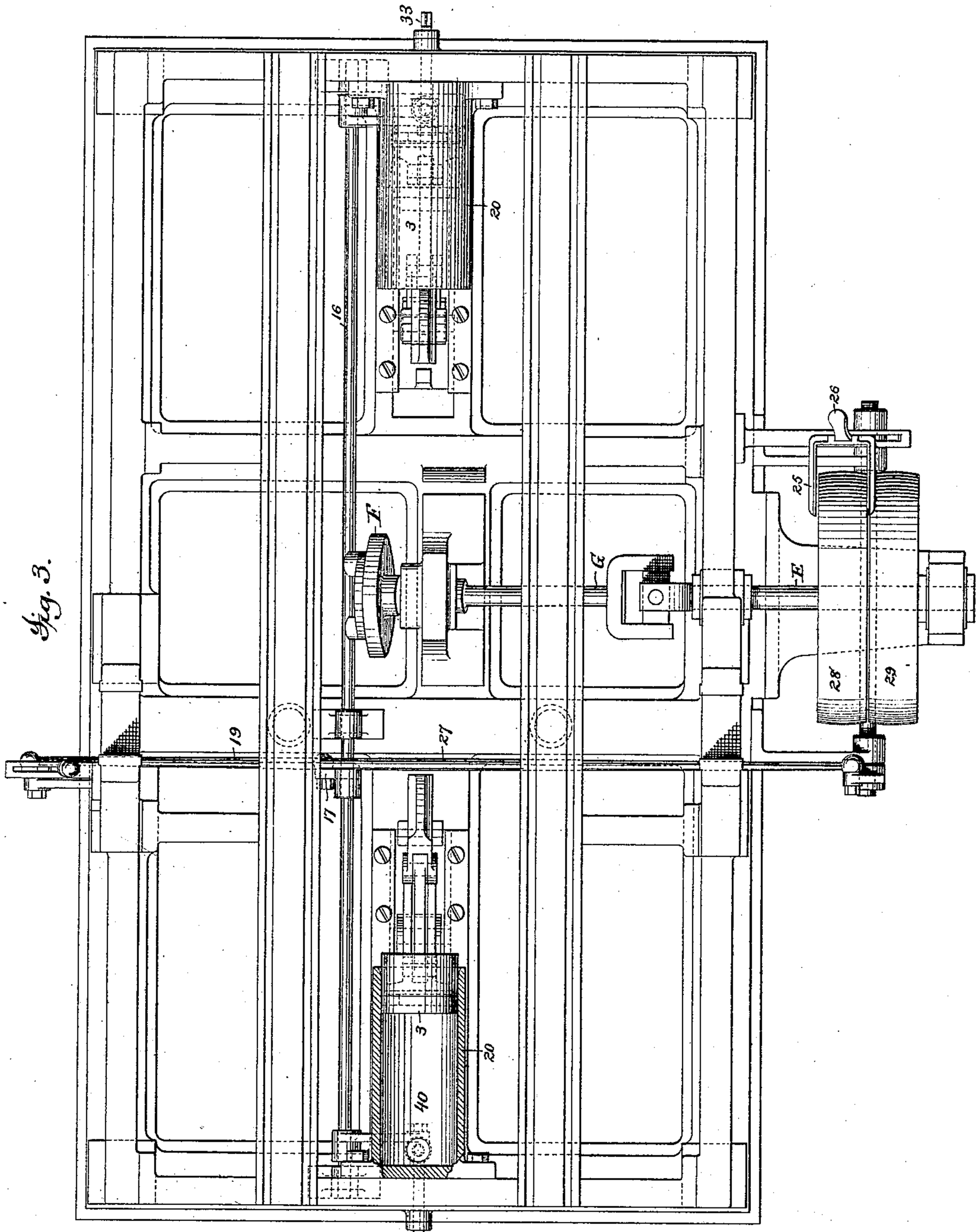

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Fig. 8.

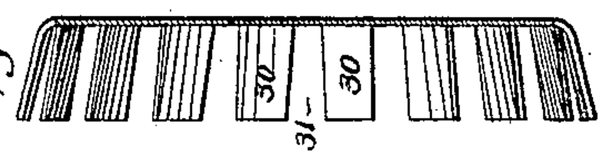


Fig. 7.

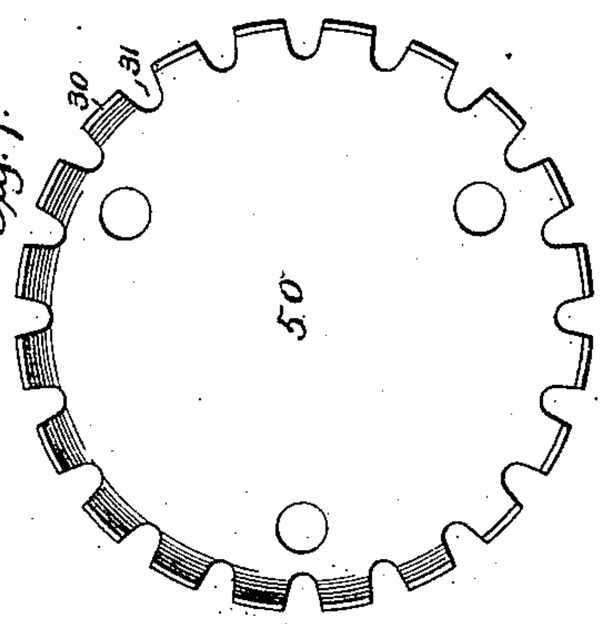


Fig. 9.

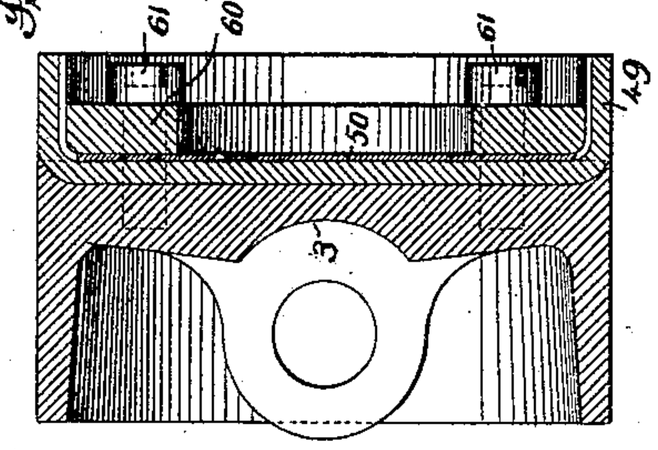


Fig. 10.

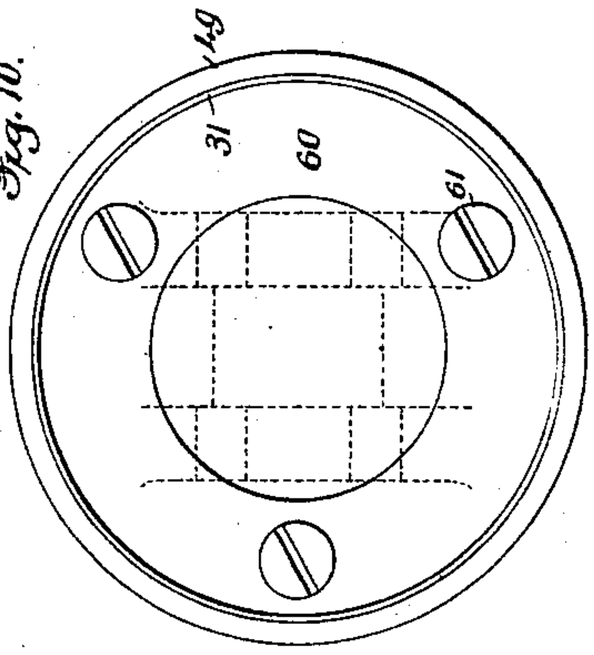


Fig. 6.

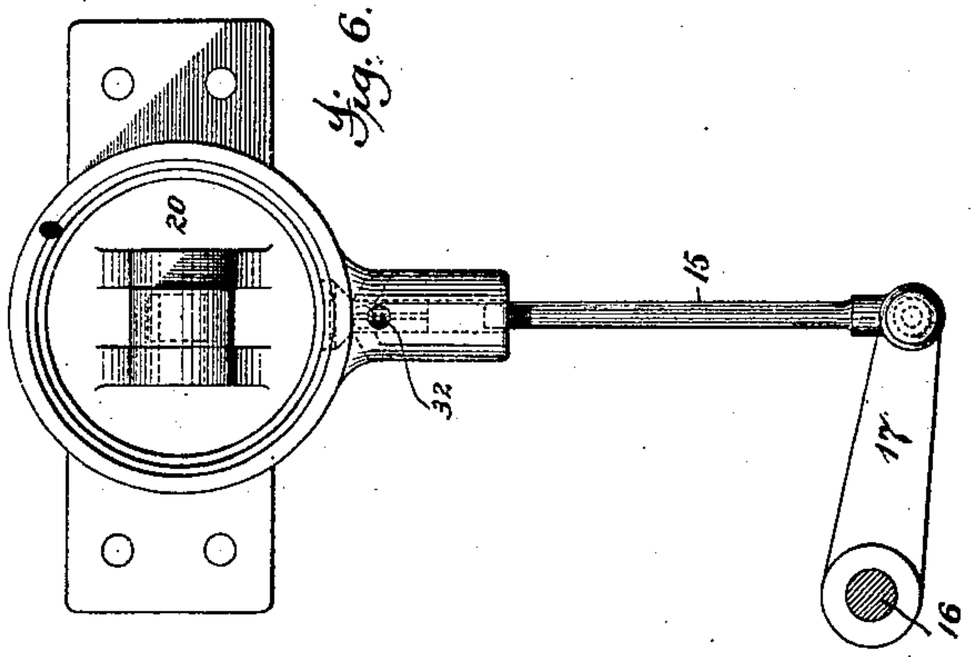
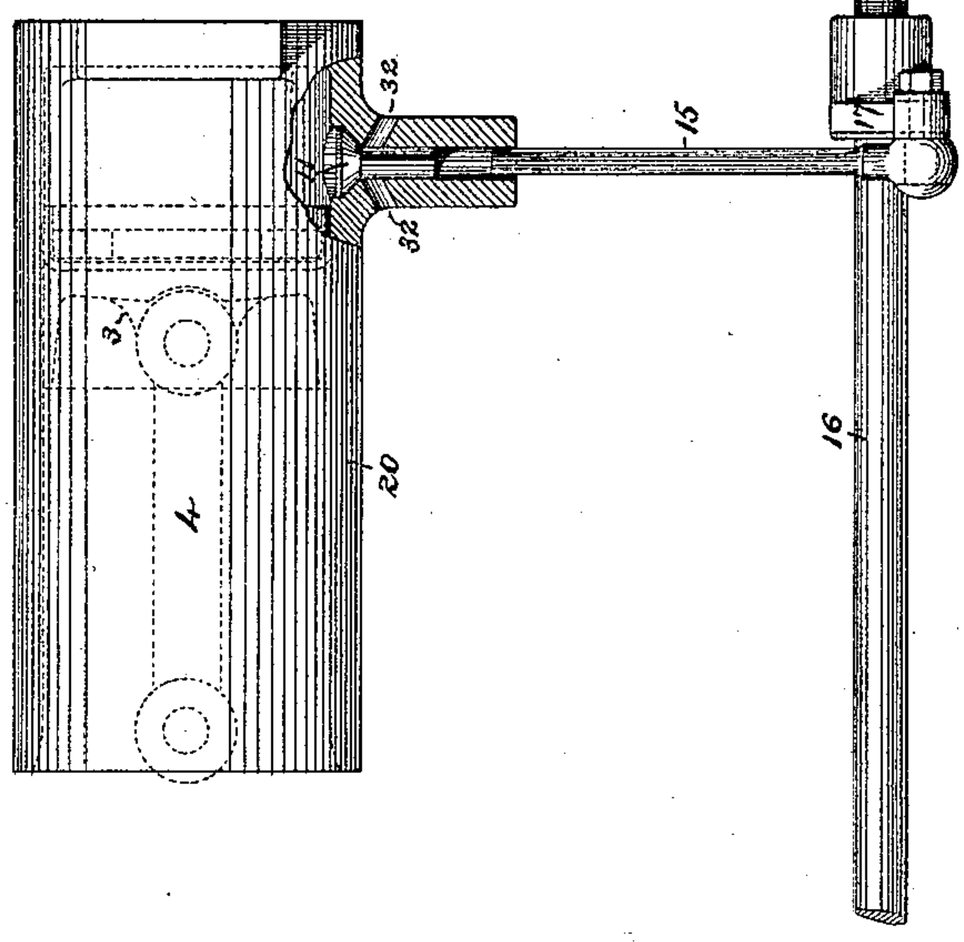


Fig. 5.



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(No Model.)

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Printing Machine.

No. 241,168.

Patented May 10, 1881.

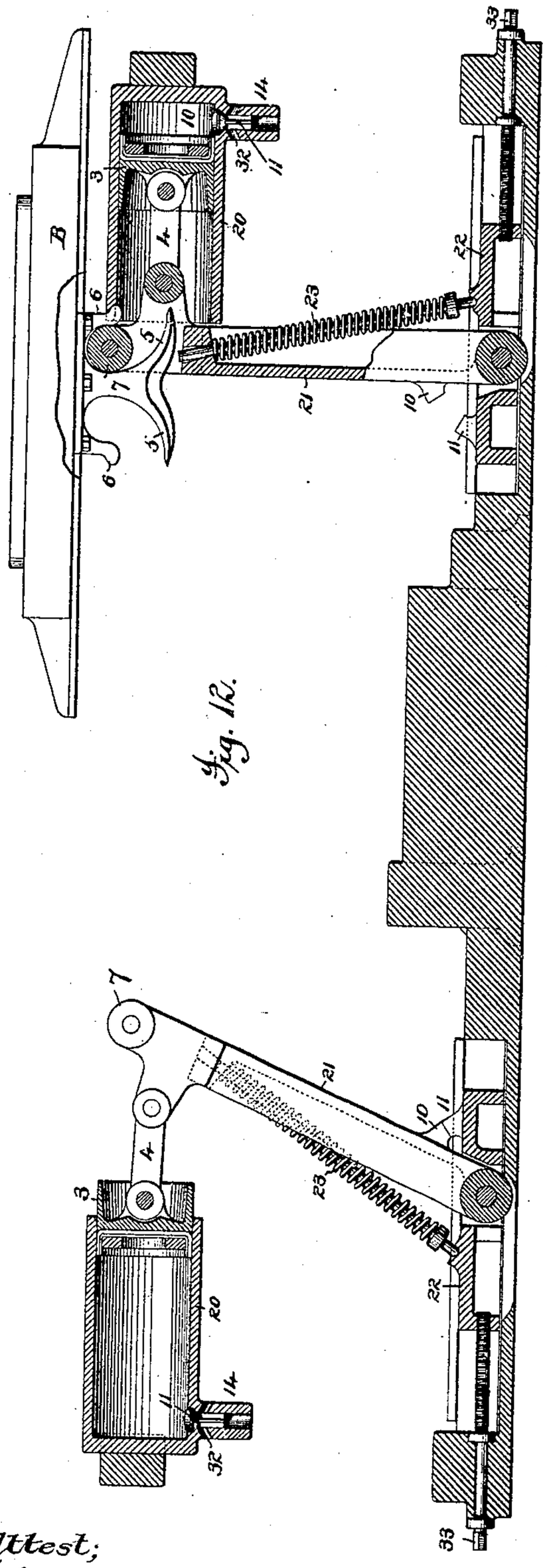

Fig. 12.

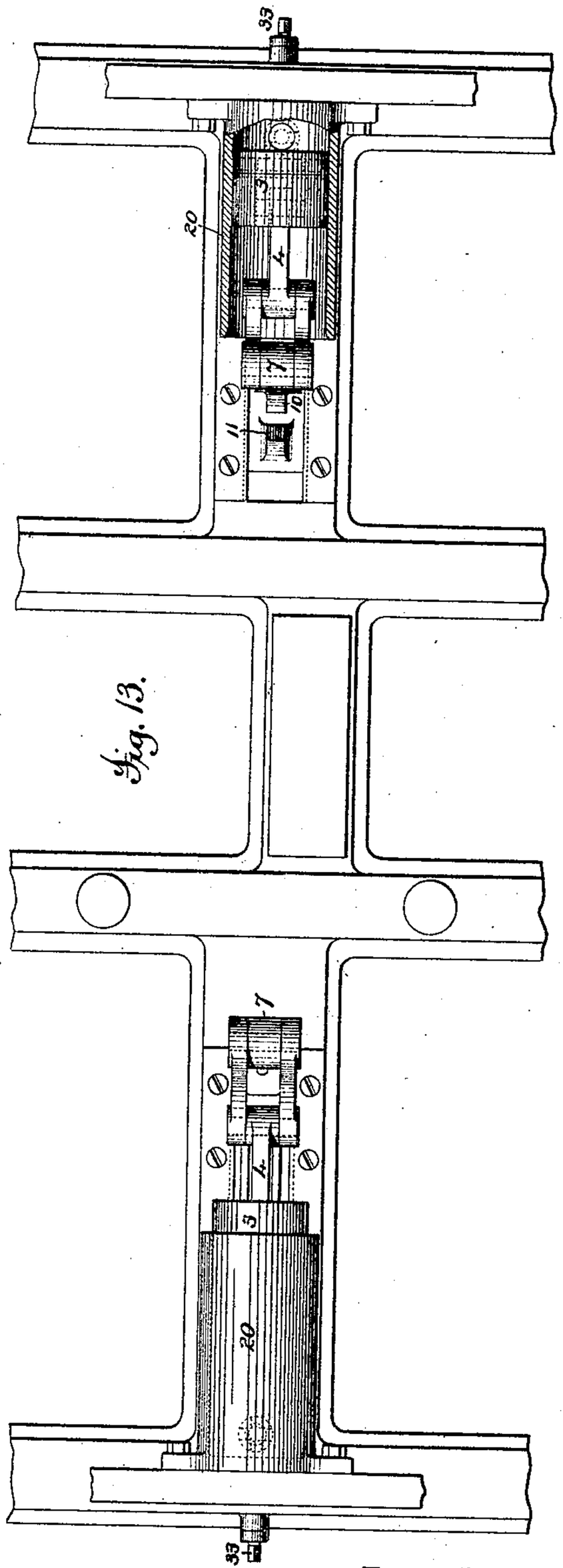

Fig. 13.

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UNITED STATES PATENT OFFICE.

STEPHEN D. TUCKER, OF NEW YORK, N. Y.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 241,168, dated May 10, 1881.

Application filed March 15, 1881. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN D. TUCKER, a citizen of the United States, residing in the city of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Printing-Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates particularly to printing-machines having reciprocating type-beds, and is especially directed to aid the type-bed-propelling mechanism, not only to arrest the bed at the end of each stroke, but also to start it in the opposite direction by a structure known as an "air-spring," and which consists of an air-cylinder in which a piston is reciprocated by the bed, and thereby caused to compress a body of air in the cylinder, which operates to gradually overcome the momentum of the bed, and finally arrest its movement, and then aid in starting it in the opposite direction.

The invention more particularly relates to that class of such air-springs in which the piston never leaves its cylinder, and always moves to the same extent into the cylinder in the operation of compressing the air, but its outward movement is adjustable; and it consists in providing said piston with a means for adjusting its outward movement, so that the time it shall begin to compress the air, and the quantity of air to be compressed to form the spring, may be regulated with respect to the travel of the bed.

The invention also embraces a particular means for accomplishing this result.

It also includes a special construction and means of operating the relief-valves connected with the cylinders of such air-springs; and, finally, embraces the various combination of parts.

An embodiment of these improvements is illustrated in the accompanying drawings, in which a printing-machine supplied with them is shown in Figure 1 by a side elevation, in Fig. 2 by an end elevation, in Fig. 3 by a plan view of its lower part, and in Fig. 4 by a longitudinal sectional elevation, of the air-spring and parts co-operating therewith. Fig. 5 shows a side elevation of one of the air-cylinders, and Fig. 6 an end elevation of the same. Fig. 7 represents a plan, and Fig. 8 a sectional elevation, of the improved packing, and Fig. 9 a sectional elevation of the piston supplied with such packing, and Fig. 10 an end elevation of said piston; Fig. 11, a modified arrangement of some of the parts. Fig. 12 illustrates by a sectional elevation, and Fig. 13 by a plan view, a modified arrangement of the parts.

The principal features of a printing-machine of the class to which this invention is applicable are an impression-cylinder, A, that is mounted to turn in suitable bearings and to co-operate with a reciprocating type-bed, B, upon which is secured the form C. There are various arrangements of mechanisms for causing the impression-cylinder A and type-bed B to travel in unison during the printing operation, and to admit of the return movement of said bed.

In structures of this class of press the motions of its parts are all derived from a main driving-shaft, as E.

In most approved constructions the reciprocating bed B is driven from the shaft E by means of a vibrating shaft, G, that carries a pinion, F, which travels on the upper and under sides of a toothed rack, R, having end shoes or reversing-guides S, as is common; but this motion is sometimes produced by other means.

Various constructions of gearing are in use for connecting the driving-shaft with the cylinder-shaft D, as, for instance, a toothed-wheel on the shaft E may drive an intermediate wheel, which will gear into a toothed-wheel on the shaft D of the cylinder, all of which will be well understood by those conversant with this art, and no further or more particular description of the class of printing-presses having reciprocating beds, to which these improvements are applicable, is necessary for a thorough understanding of the same.

At each end of the machine it is supplied with an air-cylinder, as 20, suitably fixed to the frame-work, in which cylinders a piston, 3, is arranged to reciprocate, said piston being connected by a pivoted rod, 4, to a vibrating lever, 21, which lever is fulcrumed at its foot by a pivot hung in a block, 22, that is arranged to slide in suitable guides in the frame-work, and is provided with a tapped screw, 33, by the rotation of which said block may be moved to and from the air-cylinder to change the posi-

tion of the fulcrum of said lever 21. These levers 21 are provided at their upper ends with branch arms 5 6, that form a curved guideway, in which a stud or roller, 7, carried by the bed B enters, this curved guideway thus acting to cause the roller 7 to gently engage the arm 5 of the lever 21, and thus avoid a blow and the consequent noise and jar in overcoming the inertia of the lever 21 and piston 3, which are thus gradually started and moved rearward, whereby the air in the cylinder is compressed and its resistance is gradually increased. The arm 6 coacts with the arm 5 to form a perfect guideway, or one that bears upon both sides of the stud or roll 7, and while this arm 6 is not essential, as will hereinafter appear, it is the preferable mode of insuring the movement of the lever and piston toward the center of the machine, for the reason that the stud 7, engaging said arm 6, causes the lever 21 to be positively moved, and to carry with it the piston 3. This lever 21 is provided with a spring, 23, seated upon the block 22, and pressing against the upper end of the lever 21, the power of which spring is exerted to move said lever inward or toward the center of the machine, and retain it there while the lever is not in contact with the bed, the extent of this movement of it being determined by an arm, 10, carried by the lever that engages a stop, 11, projecting from the block 22.

If, from leakage or any other cause, the compressed air should not press the piston and lever outward, the action of the roller 7 on the branch arm 6 will, as the bed recedes, draw it out until the arm 10 on the lever strikes against the stop 11 on the block 22, and the lever will be retained in this position while the bed continues its travel by a spring, 23, and if this spring should be made sufficiently strong it might serve to press the lever outward, instead of its being drawn out by the action of the roller 7 on the branch arm 6; but I prefer the use of the branch arm for the above purpose. Any accidental or improvident moving of the lever 21 rearward is thus prevented, and the said lever is restored and held in a proper inward position to present its end in correct relation to the bed to be engaged and moved by the stud or roll 7.

As the lever 21 carries an arm, 10, which always strikes against a stop, 11, on the block 22, it is apparent that the forward throw of this lever would always be the same if its fulcrum were a fixed one. The piston 3, which is necessarily moved into the cylinder to the same extent by the positive movement of the type-bed, would thus always move outward in the cylinder to the same degree, and consequently the body of air contained in its chamber 10 would remain the same and be compressed to the same degree, so that, no matter what the speed and momentum of the bed might be, the resisting action of the air-spring would remain uniform; but these presses are required to run at different speeds, according to the kind of work performed by them; and therefore, in order to obtain the best results in the use of the air-springs as an arresting mechanism for their beds, it is requisite that the resistance or power of such air-springs shall be regulated to suit the speed and momentum of the beds.

As before stated, the type-bed will always move the piston into the cylinder to the same point; but by operating the screw 33 the extent of the outward movement of the upper end of the lever 21 may be adjusted so as to lessen or increase the outward movement of the piston 3 in its cylinder, and thus govern the size of the chamber 40, and consequently the quantity of air that will be compressed therein by the return movement of said piston. Thus the quantity of air in the chamber, and which, whatever the quantity, will always be compressed into the same space, may be regulated by simply shifting the fulcrum of the lever 21, and according as the quantity of air in the chamber is more or less so will the pressure at the end of the stroke of the piston be more or less.

The valve 11, with which each cylinder 20 is provided to control an air-orifice in the chamber 40, at a point beyond that to which the piston is thrown rearward in said cylinder, is an ordinary puppet-valve, and in order that it may be opened and held open when the press is not in operation, so that the piston 3 may be free and the bed be readily moved outward or inward to admit access to the form it carries, the machine is provided with a means for operating said valves automatically in the operation of moving the belt-shifter. To that end these puppet-valves 11 are seated in a guide-sleeve, 14, into which a lifting-rod, 15, is entered. Said rod 15 is connected by a rock-arm, 17, with a longitudinal rock-shaft, 16, that is provided with a rock-arm, 18, connected by a rod, 19, with the lever 24, which operates the belt-shifter 25, said belt-shifter being provided with a second lever, 26, for operating it, which lever is by a rod, 27, connected with the lever 24, this provision being made so that the driving-belt may be moved from either side of the machine.

When the belt-shifter 25 is operated to move the driving-belt from the fast pulley 28 to the loose pulley 29, and thus stop the operation of the machine, it is apparent that the rods 15 will be lifted to engage the stem of the valves 11, and thus raise said valves to establish communication from the air-chambers 10 with the atmosphere through the passages 32, and hence relieve the piston 3 from the pressure, and allow the bed B to be readily moved outward and inward by the hand of the operator without undue labor. When the belt-shifter is moved to throw the driving-belt upon the fast pulley these rods 15 will be lowered and permit the said valves 11 to seat themselves, and thus close the chambers, so that during the further movement of the piston therein the valves will confine the air so that it may be compressed to perform the functions of an air-spring. If, from leakage or any other cause, there should be an insufficiency of air in the cylinders, the bed will

draw the pistons out, and the valves will be lifted by atmospheric pressure, and air admitted until an equilibrium with the external air is established. Thus these valves perform a double function—that of relief-valves when the machine is not in operation, and of inlet-valves while the machine is running.

Instead of the construction of lever 21 and spring 23, as heretofore described, the block 22 may have an arm, as 45, reaching backward with a projection at the end, and the spring 23, seated against this projection, will press the lever forward, as shown in Fig. 11.

The function performed by the curved arms 5 6, carried by the levers 21, may be likewise accomplished by the modified construction shown in Fig. 12, where the bed B is shown to be provided with the curved arms 5 and 6, and the stud or roller 7 is formed at the end of the levers 21. This structure, as is apparent, is the equivalent of that shown in the principal drawings, and quite within the scope of the invention.

Owing to the great pressure at which the air-springs are worked, the packing with which their pistons are supplied is subjected to great wear, which often causes injurious leakage. This is true of the packing of all air-compressing devices. It has been common to pack such pistons with an ordinary cup-packing, but practically this has been found to be defective.

My improved form of packing (shown herein, but not claimed) consists in providing the ordinary cup-packing, as 49, Fig. 9, with a basket-spring, 50, whereby the continuous flange of the cup-packing 49 is pressed outwardly against the surface of the cylinder with a pressure regulated by a multiplicity of independent spring-arms. This basket-spring 50 consists of a disk of suitable spring metal, having its edge turned up to form a flange, which flange is divided by removing a number of parts, as 31, to provide a series of spring-arms, 30, each capable of movement independent of the other, which structure affords a multiplicity of spring-arms adapted to bear at points very close to each other upon the inner surface of the flange 49 of the cup-packing, and thus to press said flange 49 very snugly and evenly against the surface of the cylinder, and to give elastically at any circumferential point of the packing at any time during the reciprocatory movements of the piston.

The piston 3 is provided with a proper shape suited for the cup-packing 49, and the same is held in place therein by means of the basket-spring 50 and a ring, 60, all of which parts are secured to the piston by means of the screws 61, that pass through holes in the ring, spring, and packing, and enter tapped holes in the piston.

I do not broadly claim means for operating the valves of the cylinders which are connected with the belt-shipping apparatus.

What is claimed is—

1. The combination, with a reciprocating bed, the cylinder 20, the piston 3, and lever 21, of a base-block, 22, in which said lever is fulcrumed, and means for adjusting said block to and from the center of the machine to regulate the throw of said piston, all substantially as described.

2. The combination of the bed B, cylinder 20, piston 3, lever 21, base-block 22, and regulating-screw 33, substantially as described.

3. The combination, with the bed B, cylinder 20, and piston, as 3, moved in said cylinder by the reciprocation of the bed, of valves, as 11, lifting-rods 15, unattached to said valves, whereby the latter may operate independently of the rods, and means, substantially as described, connecting said rods with the belt-shifter.

4. The combination, with the reciprocating bed, air-cylinders, and pistons, the latter reciprocated by the movement of the bed, but not withdrawn from the cylinders, of valves, as 11, constructed to act automatically as supply-valves, and provided with means for operating them as relief-valves, all substantially as described.

5. The combination of the reciprocating bed B, cylinders 20, levers 21, and pistons 3, substantially as described.

6. The combination, with the reciprocating bed B, cylinder 20, piston 3, and lever 21, of the curved arm 5, substantially as described.

7. The combination, with the reciprocating bed B, cylinder 20, piston 3, and lever 21, of the spring 23, substantially as described.

8. The combination, with the reciprocating bed B, of cylinder 20, piston 3, lever 21, and curved arms 5 and 6, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

STEPHEN D. TUCKER.

Witnesses:

CHAS W. CARPENTER,

ERNEST VOORHIS.