

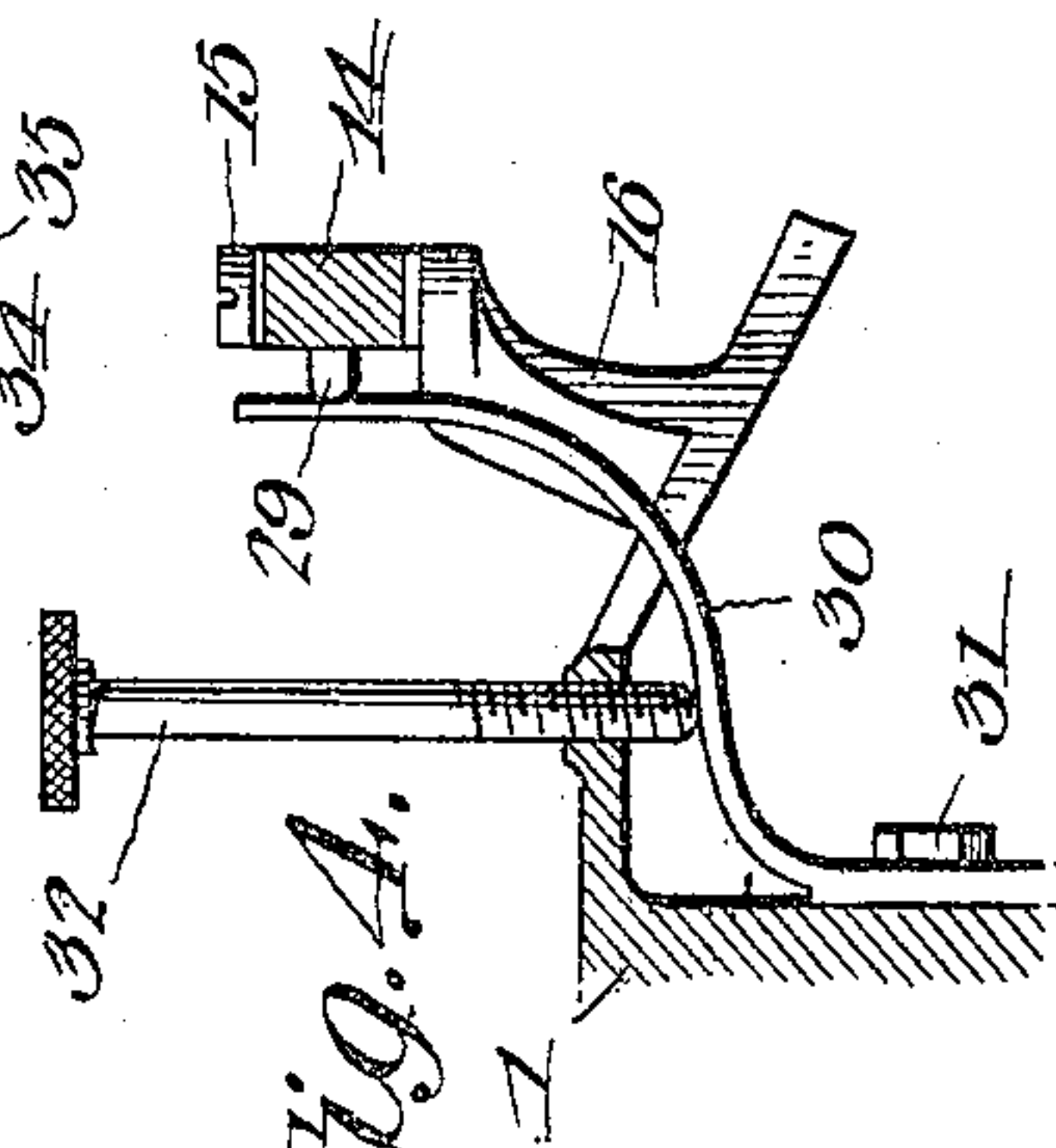
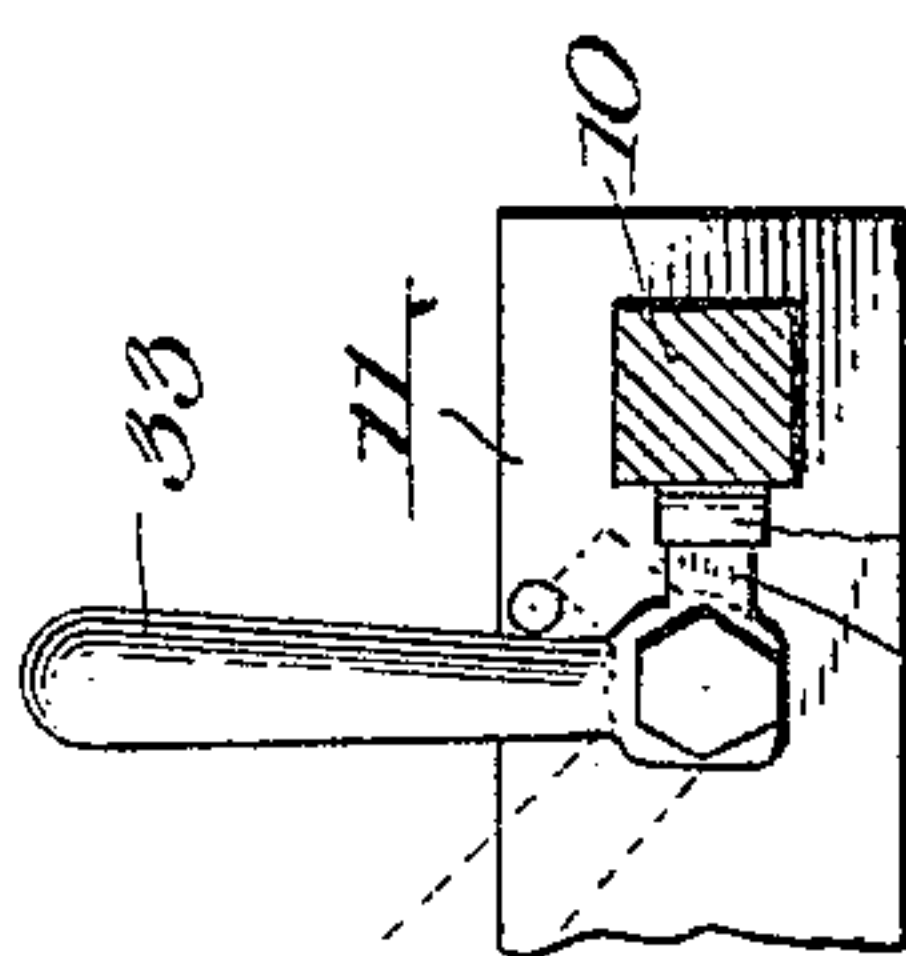
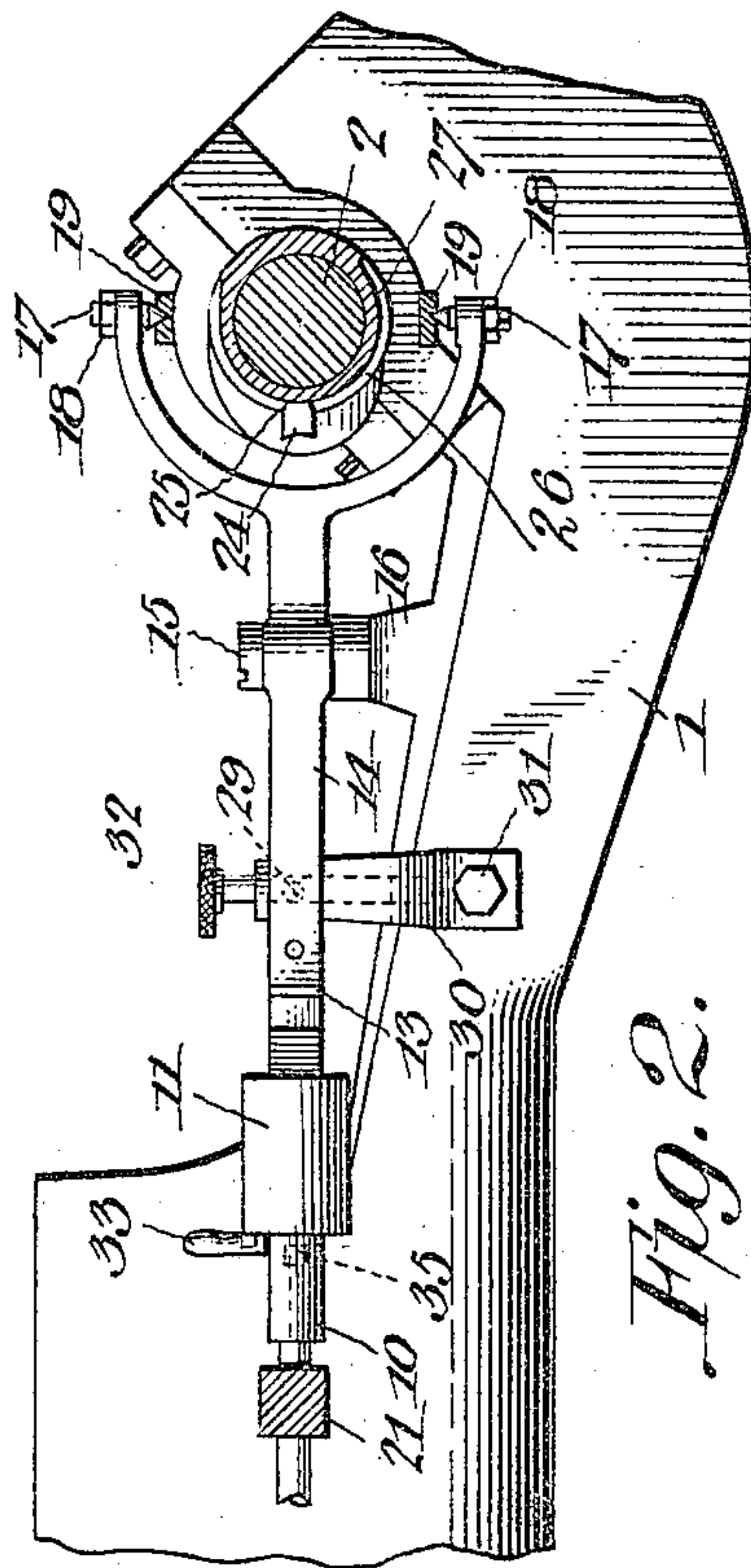
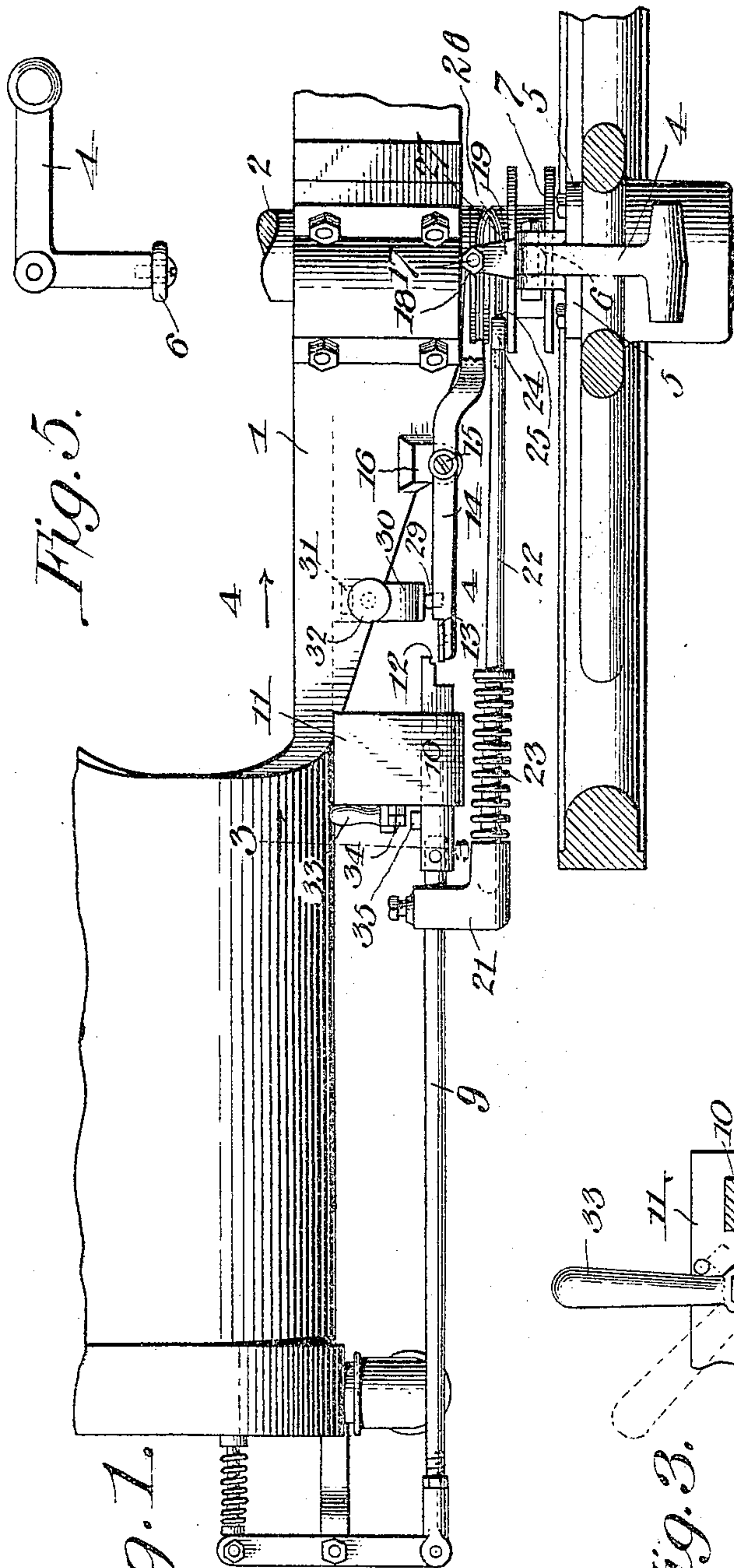
No. 801,169.

PATENTED OCT. 3, 1905.

D. F. WILLIAMS.

SPEED REGULATOR FOR EXPLOSION ENGINES.

APPLICATION FILED MAR. 9, 1904.



Witnesses

Witnesses
B. H. Stewart
Jno E Carter

David F. Williams,
Inventor.

by

Cash & Co.
Attorneys

UNITED STATES PATENT OFFICE.

DAVID F. WILLIAMS, OF GRANVILLE, NEW YORK, ASSIGNOR TO RUGGLES MACHINE CO., OF POULTNEY, VERMONT.

SPEED-REGULATOR FOR EXPLOSION-ENGINES.

No. 801,169.

Specification of Letters Patent.

Patented Oct. 3, 1905.

Application filed March 9, 1904. Serial No. 197,383.

To all whom it may concern:

Be it known that I, DAVID F. WILLIAMS, a citizen of the United States, residing at Raceville, in Granville, in the county of Washington and State of New York, have invented a new and useful Speed-Regulator for Explosion-Engines, of which the following is a specification.

This invention relates to improvements in explosion-engines, and has for its principal object to provide improved mechanism for governing the speed of the engine, a further and important object being to so arrange the governing mechanism as to permit of manual adjustment while the engine is running, so that the speed may be increased or decreased in accordance with the load.

A further object of the invention is to provide a novel form of valve-operating mechanism whereby the opening and closing of the exhaust-valve may be fully controlled, provision being made for locking the mechanism in such manner as to prevent the closing of the valve when it is desired to stop the engine.

With these and other objects in view, as will be more fully hereinafter described, the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a plan view, partly in section, of sufficient of an explosive-engine to illustrate the invention. Fig. 2 is a transverse sectional elevation of the same. Fig. 3 is a detail sectional view on the line 3 3 of Fig. 1. Fig. 4 is a similar view on the line 4 4 of Fig. 1. Fig. 5 is a view of one of the governor-arms detached.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The general frame 1 of the engine may be of any ordinary character and provided with suitable bearings for the support of a main crank-shaft 2. On this shaft is mounted a balance-wheel, the hub portion of which carries a centrifugal governor, or said governor may be carried in any suitable manner by a

supporting means revolving with the shaft. In the present instance each of the governor-arms is in the form of a bell-crank lever 4, having one weighted arm and pivoted at the point of bifurcation of the arms to brackets 5, that are secured to the balance-wheel. The opposite arm of each lever is provided with an antifriction-roller 6, that fits within a grooved collar 7, secured to the shaft in such manner as to permit free longitudinal movement thereof, and this collar has two flanges for contact with the antifriction-roller 6, so that positive movement of the collar in both directions is assured.

The main operating-rod 9 of the exhaust-valve is provided with a preferably rectangular portion 10, which slides in a guiding-opening formed in a lug 11, secured to or integral with the frame of the engine, and the crank-shaft end of the rod is stepped, as indicated at 12, forming shoulders to be engaged by a wear-plate 13, secured at one end of a lever 14, the wear-plates being secured in position by screws or similar fastening devices, so as to permit their renewal when necessary. The lever 14 is pivoted on a stud or bolt 15, carried by a lug or bracket 16, and the rear end of said lever is bifurcated, presenting two arms which extend partly around the crank-shaft, and the outer end of each arm is threaded for the reception of a pointed pivot-screw 17, which may be locked in place by a jam-nut 18. The pivot-screws fit into recesses formed in ears 19, which project from the movable collar 7, and the arrangement of parts is such that when the speed of the engine is increased beyond a certain predetermined point the governor-arms in spreading will draw the sleeve 7 closer to the wheel and throw the cylinder end of the lever 14 away from the balance-wheel in such position as to permit its engagement with the shouldered end of the exhaust-valve rod, and thus prevent closing movement of the exhaust-valve and as a consequence reduce the speed of the engine. The exhaust-valve will be held in its open position until the speed has been reduced to such an extent as to allow the weights of the governor-arms to approach each other, the lever 14 being then removed from engagement with the exhaust-valve rod and allowing the exhaust-valve to close and the engine to resume its normal operation.

To the exhaust-valve rod is secured a bracket 21, having an opening for the reception of one end of a short rod 22, that at all times is pressed in the direction of the shaft by a helical compression-spring 23. At the crank-shaft end of the rod is a block 24, provided with a rib 25, which traverses a groove 26, formed in a valve-operating cam 27, secured to the shaft. The groove is continuous and the two parts of the groove intersect, so that at each two complete rotations of the shaft the block 24 will have traversed the groove once. For one revolution of the cam the groove is concentric with the shaft and the cam effects no longitudinal movement of the rod. In the remaining half of the cam-groove the cam has a projecting portion which is arranged eccentric to the axis of the shaft, so that the valve-rod will be operated and the exhaust-valve opened once during each two complete revolutions of the shaft in accordance with the usual practice in four-cycle engines.

The lever 14 is provided with a small block 29, which is engaged by a flat spring 30, tending to resist the spreading of the governing-arms under the influence of centrifugal force. One end of the spring is secured by a bolt 31 to the frame of the engine, and at an intermediate point in the length of the spring is an opening for the passage of an adjusting-screw 32, which may be turned to increase or decrease the stress of the spring in accordance with requirements.

At one side of the lug 11 is pivoted a stopping-lever 33, which may be moved to a vertical position in order to bring its smaller arm 34 in the path of travel of a pin or block 35, carried by the exhaust-valve rod, and thus stop the engine by holding the exhaust-valve open and allowing air to enter the cylinder on the suction-stroke.

In the operation of the device it will be understood that as the speed of the engine increases the governor-arms will separate under the influence of centrifugal force and sleeve 7 will be drawn in the direction of the balance-wheel. This movement will be transmitted through the ears 19 to the lever 14, and the wear-block 13 will engage the shouldered end 12 of the exhaust-valve rod. This will hold the exhaust-valve open, and in place of taking in an explosive charge the piston will draw air into the cylinder during one or more suction-strokes, and thus decrease the speed. When this occurs, the arm 14 will be moved outward and the wear-plate 13 will disengage the exhaust-valve rod. The spring 30 tends to resist the spreading movement of the governor-arms, and inasmuch as this spring may be adjusted manually while the engine is running it is possible to offer more or less resist-

ance to the opening movement of the governor-arms, and this of course will result in the adjustment of the speed of the engine. The greater the resistance offered by the spring the greater must be the speed at which centrifugal force becomes effective in moving the balls outward and force the lever 14 into engagement with the exhaust-valve rod.

Having thus described the invention, what is claimed is—

1. The combination in an explosion-engine, of an exhaust-valve, an exhaust-valve rod, a guiding means for the crank-shaft end of the rod, a crank-shaft, a grooved cam carried by the crank-shaft, a cam-rod, a bracket adjustably secured to the exhaust-valve rod and having an opening for the reception of the cam-rod, a compression-spring for forcing said cam-rod against the cam, a balance-wheel carried by the crank-shaft, a grooved non-revoluble collar carried by the shaft at a point between the cam and balance-wheel, brackets carried by the balance-wheel, weighted governor-arms having one end extending into the groove of the collar, a pair of ears projecting from the side of the collar at a point beyond the groove, a lever pivoted at a point intermediate of its length to the frame of the engine and having one end bifurcated and connected to the ears, said lever serving as a means for preventing rotative movement of the collar and receiving rocking movement from said collar, the opposite end of the lever being disposed in the path of movement of the crank-shaft end of the exhaust-valve rod, a leaf-spring rigidly secured at one end to the engine-frame and having its opposite end bearing against the lever, and an adjusting-screw extending through a threaded opening in the frame and bearing on said spring to adjust the sensitiveness of the governor.

2. The combination with an explosion-engine, of the exhaust-valve, the exhaust-valve rod having near one end a projecting lug, a bracket extending from the frame of the engine and provided with a guiding-opening for the end of the rod, a bell-crank lever pivoted to the bracket and having two arms, of which the shorter is movable into the path of movement of the lug, the longer arm of said lever constituting a handle and serving by its superior weight to normally maintain the shorter arm in inoperative position, and a stop for limiting movement of said shorter arm.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

DAVID F. WILLIAMS.

Witnesses:

FRANK C. LAMB,
M. COSTELLO.