

No. 749,996.

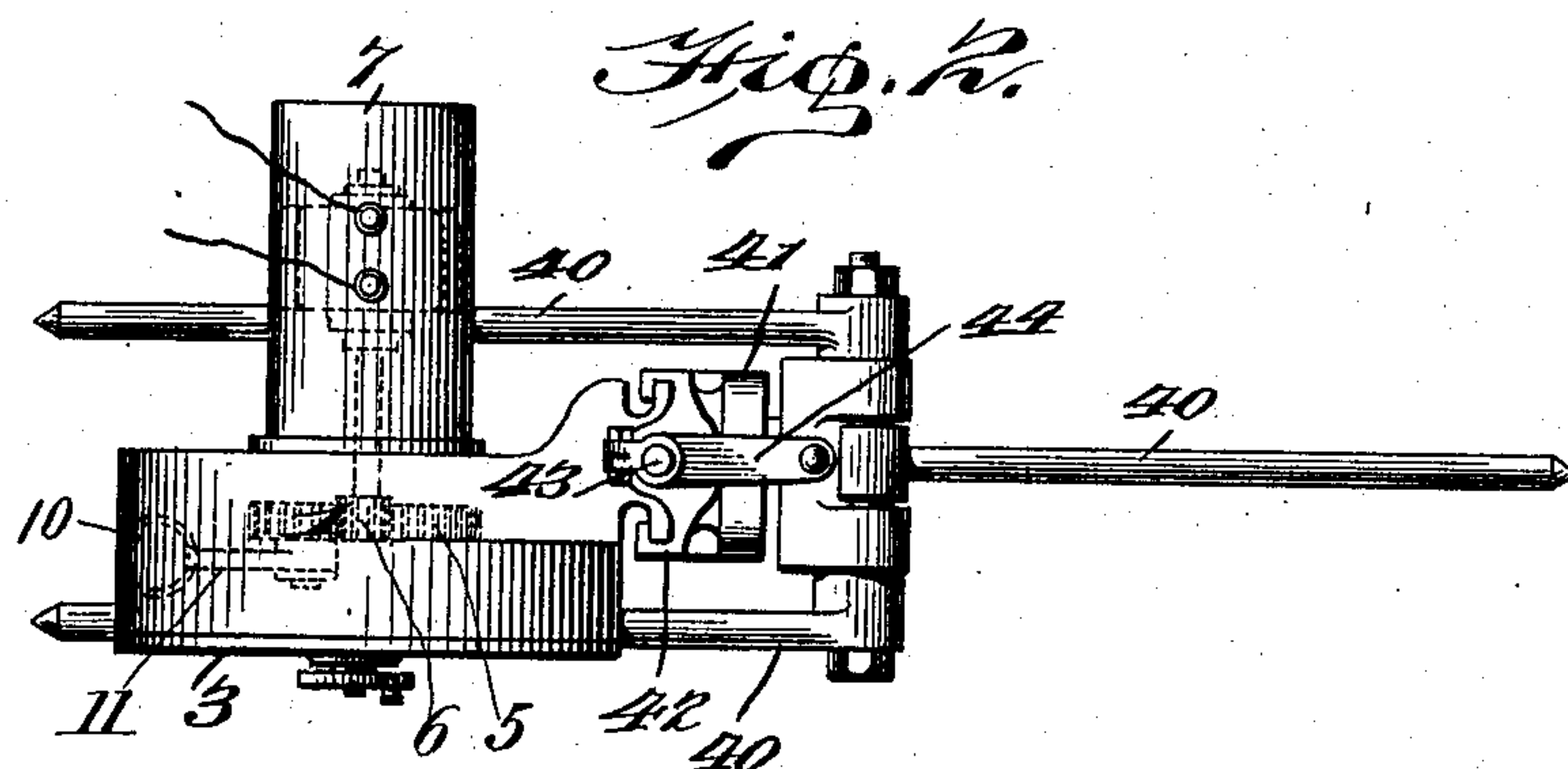
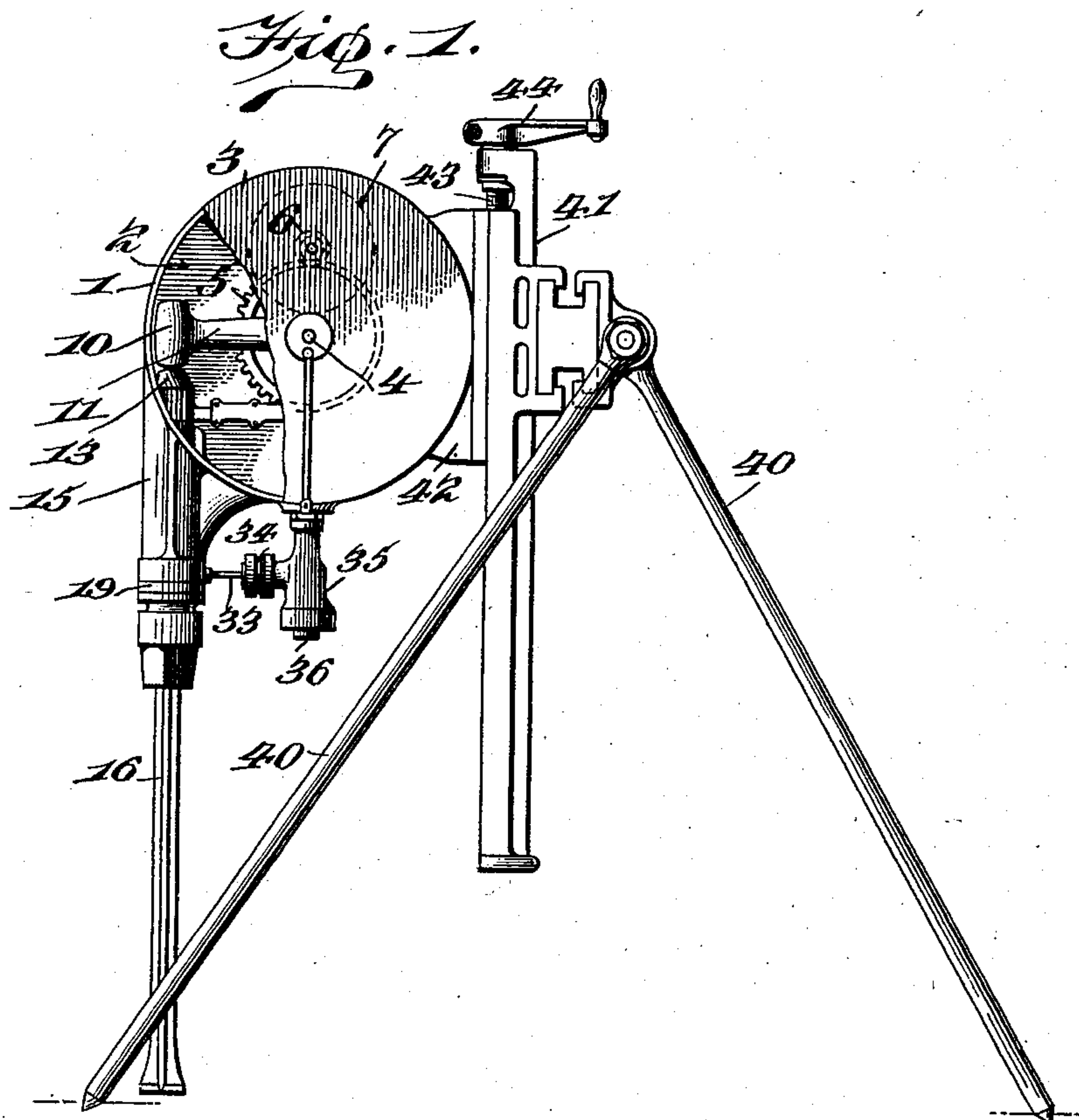
PATENTED JAN. 19, 1904.

J. KRAUS.  
POWER HAMMER AND ROCK DRILL.

APPLICATION FILED MAY 21, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



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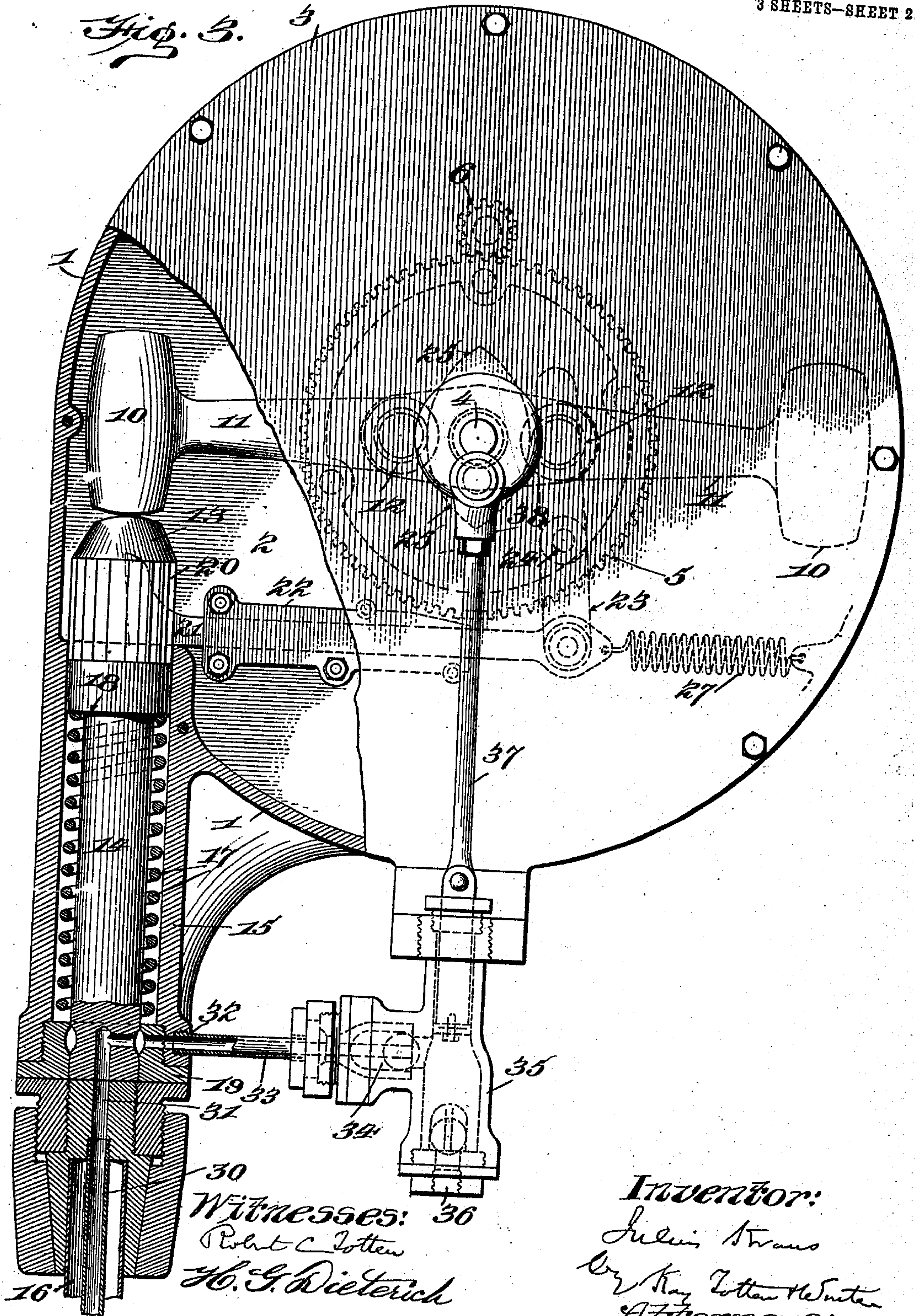
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3 SHEETS—SHEET 2.

*Fig. 3.*



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3 SHEETS—SHEET 3.

NO MODEL.

Fig. 4.

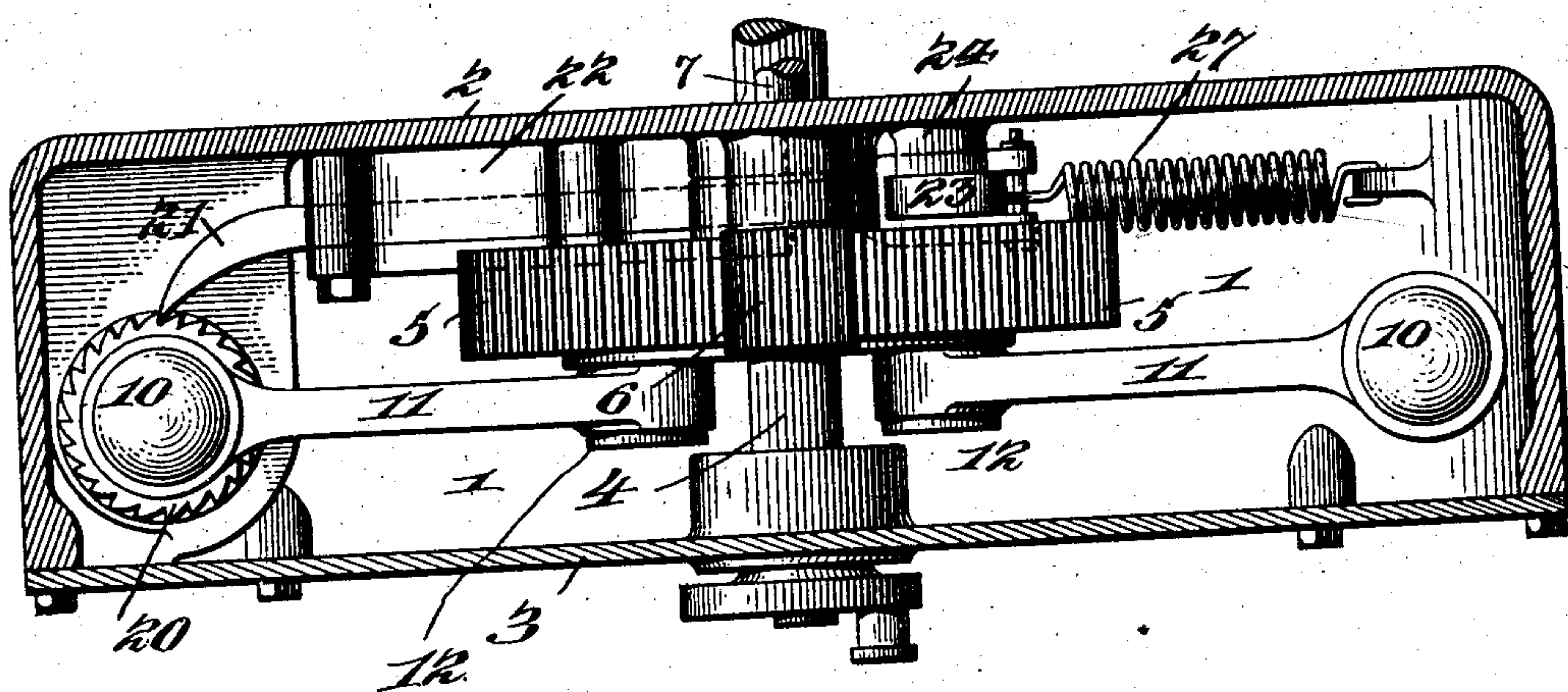
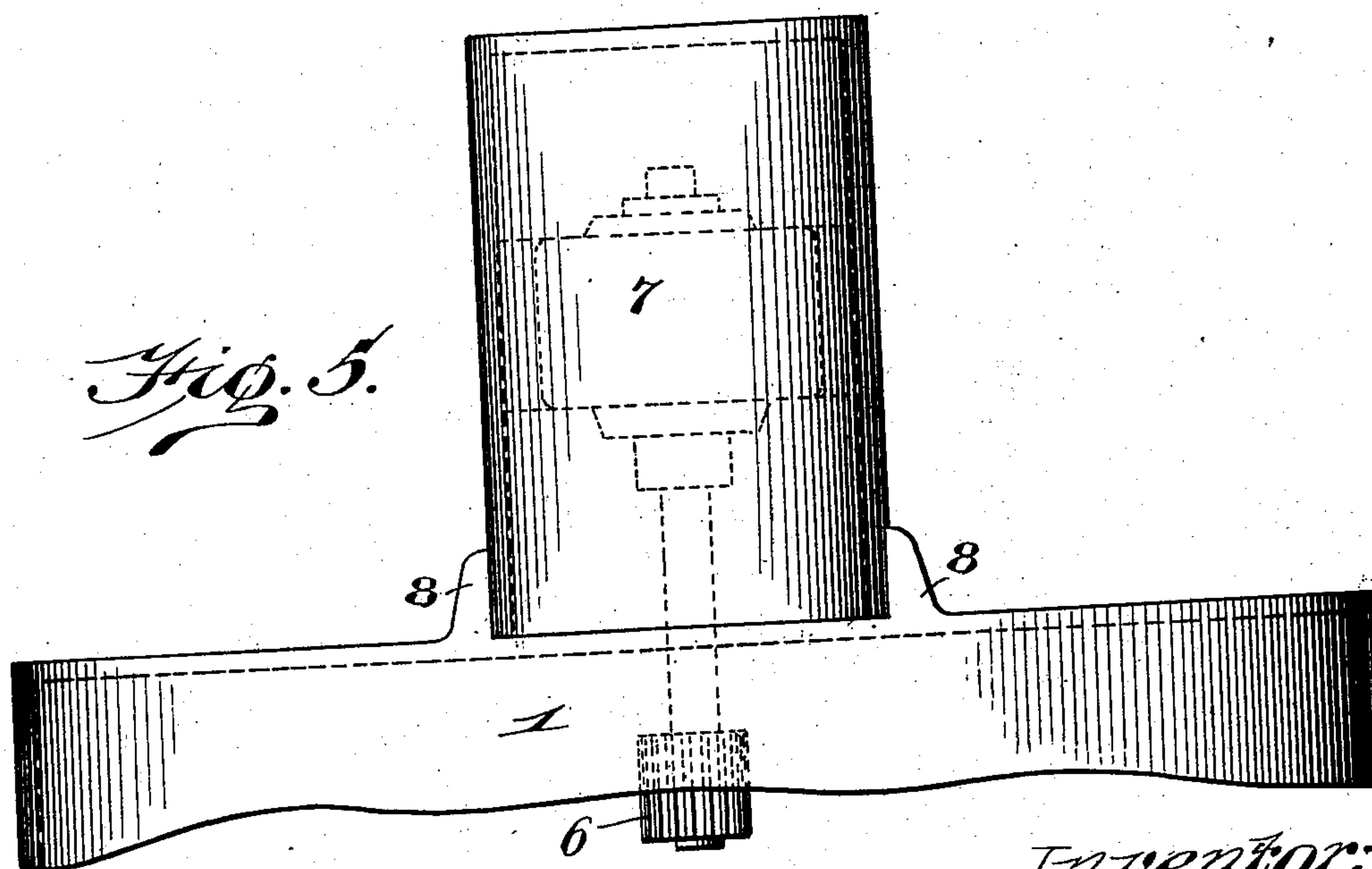


Fig. 5.



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# UNITED STATES PATENT OFFICE.

JULIUS KRAUS, OF CUYAHOGA FALLS, OHIO.

## POWER-HAMMER AND ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 749,996, dated January 19, 1904.

Application filed May 21, 1903. Serial No. 158,126. (No model.)

*To all whom it may concern:*

Be it known that I, JULIUS KRAUS, a resident of Cuyahoga Falls, in the county of Summit and State of Ohio, have invented a new and useful Improvement in Power-Hammers and Rock-Drills; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to drilling and hammering machines such as may be used for stone or coal cutting, drilling and boring, and for analogous uses.

The invention relates especially to that type of machine wherein there is a rotary shaft having hinged thereto a series of radially-disposed hammers which in the rotation of the shaft strike the drill-holder or anvil to perform the work. This type of drilling and hammering machine is not new *per se*, and my invention relates to improvements therein whereby the machine is rendered simpler in construction and more reliable and efficient in operation.

In the accompanying drawings, Figure 1 is a side view of my invention, showing the same applied as a stone or coal drilling machine. Fig. 2 is a plan view of the same. Fig. 3 is a side view of the operating mechanism on an enlarged scale. Fig. 4 is a horizontal transverse section through the same, and Fig. 5 is a detail showing the manner of applying the motor thereto.

In the drawings I have shown my invention applied to a vertical stone or rock drilling machine; but the invention is not entirely limited thereto, as certain parts thereof may be applied to hammering-machines for general use. The invention is also shown as particularly adapted for use with an electric motor for driving the same; but all parts of the invention are not necessarily limited to this specific driving means.

The operating mechanism is mounted in a suitable frame, which is shown as a casing 1 of general circular shape and having a closed back 2 and removable face or cover plate 3. Mounted in this casing is a shaft 4, and to said shaft is secured a gear-wheel 5, which is driven from a pinion 6. The latter may be the armature-pinion of an electric motor or

the driving-pinion of any other type of motor. In the drawings it is shown as the armature-pinion of an electric motor, the latter being shown at 7 secured to the back side of the casing 1, as shown in Fig. 5. This fastening comprises suitable flanges 8, formed on the casing 1 and into which the motor-casing 7 fits. In this manner an electric motor of sufficient power to operate the drill may be connected directly to the casing, thus facilitating the movement of the apparatus from place to place, no connection for the apparatus being necessary except the electric mains leading to the motor.

The hammers are shown at 10, two such hammers being used in the particular machine illustrated; but it will be evident that either one or more than two may be employed, if desired. These hammers are provided with helves 11, which are suitably hinged to the shaft 4, and for simplicity in construction it is preferable to hinge them directly to the gear-wheel 5, this connection being made by the pivot-screws 12 passing through openings formed in the inner ends of the hammer-helves and secured in suitable screw-tapped openings in the web of the gear-wheel 5. By connecting these hammers directly to the gear-wheel 5 the operating parts are reduced to a minimum, thus making the apparatus as simple as possible. By the rotation of the gear 5 these hammers will fly outwardly by centrifugal force, and on one side of the casing in line with these hammers when in their outermost positions is the anvil or head 13 of the drill-holder, against which the hammers will strike to do the work and will slide off the same in the well-understood manner. The anvil or head 13 of the drill-holder is connected to a suitable shank 14, passing through an opening in a projection 15, formed integrally with or suitably secured to the casing 1. At its lower end this projection carries a suitable chuck or clamp 15 for holding the drill 16, and said drill-holder is normally held elevated or retracted by means of a spiral spring 17, interposed between a shoulder 18 on the shank 14 and a collar 19, secured to the lower end of the projection 15.

In the working of rock-drills it is necessary



to rotate the drill after each blow or succession of blows. As a simple means for doing this the head or anvil 13 of the drill-holder is provided with a series of ratchet-teeth 20 on its periphery. These are engaged by a reciprocating pawl 21, slidably mounted in bearings 22 and having connected thereto one end of a lever 23, fulcrumed at 24 to the casing, and having its other end lying in the path of a cam 25. This cam will be of any suitable shape to actuate the lever 23 and pawl 21 at the proper time, and when two hammers are employed, as illustrated, the cam will be elliptical in shape, but the shape will necessarily vary, according to the number of hammers employed. For simplicity of construction the cam 25 is formed directly on the hub of the gear-wheel 5 in casting the latter, thus dispensing with an additional part to form said cam. A spiral spring 27 has one end connected to the inner end of the sliding pawl 21 and its opposite end secured to a stationary part of the casing 1, said spring acting normally to retract the pawl 21, so as to enable it to engage another ratchet-tooth 20 on its next outward movement by means of cam 25 and lever 23.

With stone-drills it is also necessary, or at least desirable, to supply water to the drill. As a convenient means for doing this I make the drill hollow—that is, provide it with an opening or duct 30, which communicates with a suitable duct 31 on the drill-holder 15, and this duct leads out to the side of said drill-holder at 32, from whence leads a pipe 33 to the discharge-opening 34 of a pump 35, the latter having an inlet-opening at its lower end at 36, which is connected by a suitable pipe or tube to any source of water-supply. The pump 35 may be of any type and is secured to the casing 1 so as to project radially therefrom. The piston is shown at 36, and this reciprocates vertically, being actuated by means of a connecting-rod 37, secured thereto and attached at its upper end to a crank 38 on the outer end of the shaft 4.

The drill is supported from a suitable tripod 40, as shown in Figs. 1 and 2, and in order to permit the feeding of the drill I connect to the tripod 40 a vertical guide frame or way 41, which is engaged by a projecting portion 42 of the frame or casing 1 of the drill. A feed-screw 43 is journaled in the guideway 41 and engages the projection 42, this feed-screw being provided at its upper end with a suitable handle 44, whereby it can be rotated, thus feeding the drill downwardly as required.

The operation of the apparatus will be readily understood from the foregoing description. The operation of the motor 7 rotates the gear-wheel 5, and this carries the hammers 10 around so that they strike in succession upon the drill-head or anvil 13, then sliding off the same by reason of their pivotal connec-

tions at 12 to the gear-wheel 5. Each blow of the hammers causes the drill to be forced downwardly, said drill being raised between the blows by the spiral spring 17. The rotation of the wheel 5 through the cam 25 oscillates the lever 23, thus operating the sliding pawl 21 and rotating the drill in the intervals between the blows. The pump 35 is also operated directly from the shaft 4, thus supplying water to the drill. As the drilling progresses the operator will turn the screw 43, thus feeding the drill downwardly.

The drill shown and described is very compact and simple, the number of parts being reduced to a minimum, thus rendering the operation of the apparatus very efficient and reliable. Furthermore, the mounting of the motor directly on the casing enables the apparatus to be moved about with facility, as the electric mains leading to the motor offer practically no obstruction in moving the apparatus. By this reason the drill is capable of very wide use and in places where ordinarily it is difficult to place a rock-drill.

By merely substituting a stationary anvil for the head 13 of the drill my apparatus may be used for ordinary blacksmith-hammering or the like, and certain features of the invention are intended to have this use and not to be limited entirely to use as a stone-drill.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a hammering-machine, the combination with a frame or casing, a motor-driven pinion mounted in said machine, a gear with which said pinion meshes, one or more hammers provided with arms which are pivotally connected directly to said gear, and an anvil or the like in line with the hammers when in their outermost positions.

2. In a hammering-machine, the combination with a frame or casing, of a gear mounted to rotate in said frame or casing, means for rotating said gear, one or more hammers provided with arms which are hinged directly to said gear, and an anvil or the like in line with said hammers when in their outermost positions.

3. In a drilling-machine, the combination with a frame or casing, of a gear rotatably mounted in said frame or casing, means for rotating said gears, one or more hammers provided with arms hinged directly to said gear, a drill-holder in line with the hammers when in their outermost positions, a ratchet on said drill-holder, a pawl for engaging said ratchet, and a cam formed on said gear for actuating said pawl.

4. In a hammering-machine, the combination with a frame or casing, of a rotating gear mounted in said casing, an electric motor mounted on said casing and having its armature-pinion meshing with said gear, one or more hammers provided with arms pivotally



connected directly to said gear, and an anvil or the like in line with the hammers when in their outermost positions.

5 In a drilling-machine, the combination with a circular frame or casing, a rotating shaft mounted centrally therein, one or more hammers provided with arms hinged to said shaft, a drill-holder mounted in a tangentially-projecting hollow portion of said casing, a  
10 pump rigidly secured to said casing, an op-

erating-rod for said pump actuated from said rotating shaft, and rigid pipe connections from said pump to the hollow tangentially-projecting portion of the casing.

In testimony whereof I, the said JULIUS 15 KRAUS, have hereunto set my hand.

JULIUS KRAUS.

Witnesses:

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J. B. MERRIMAN.