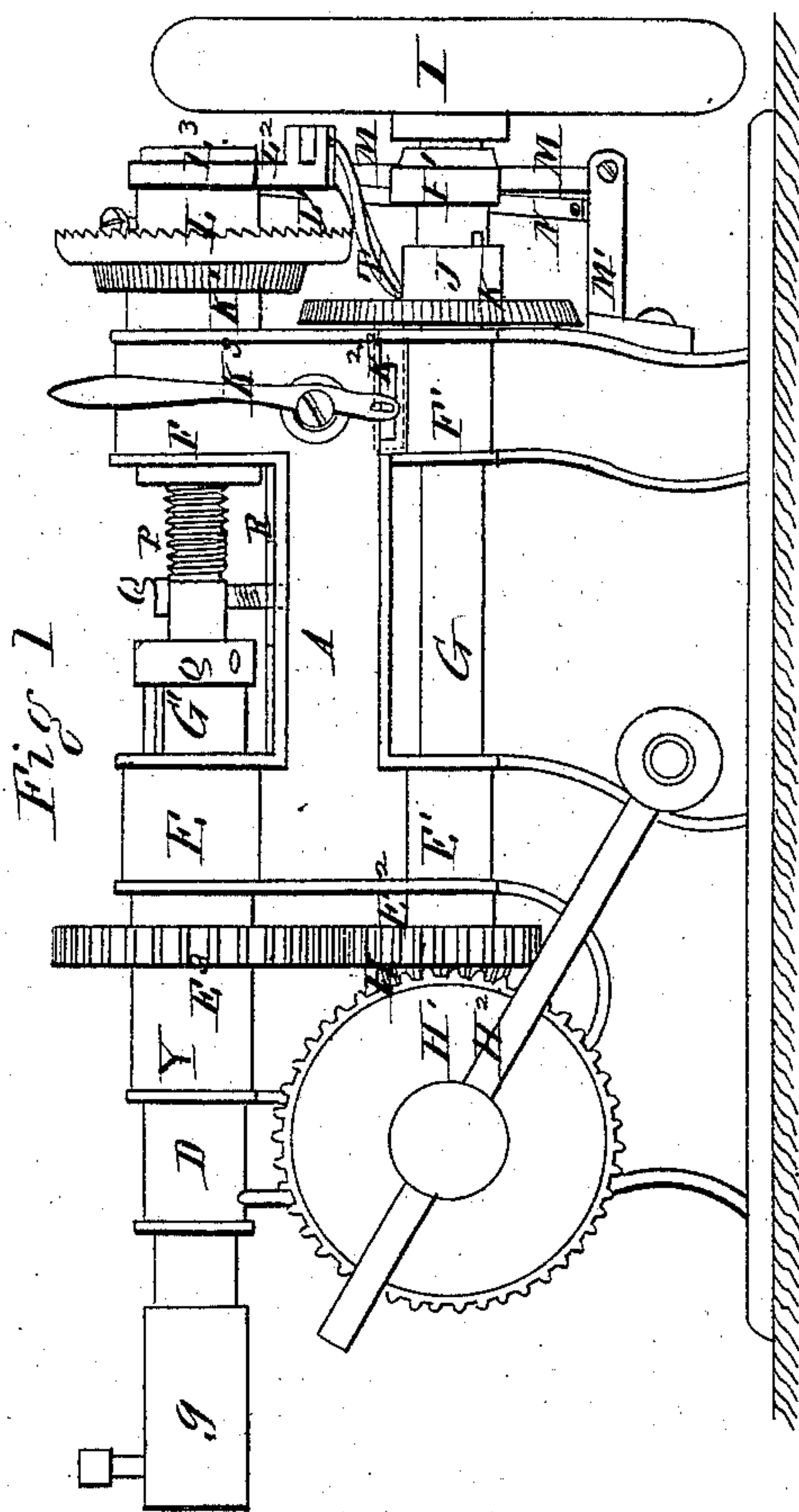
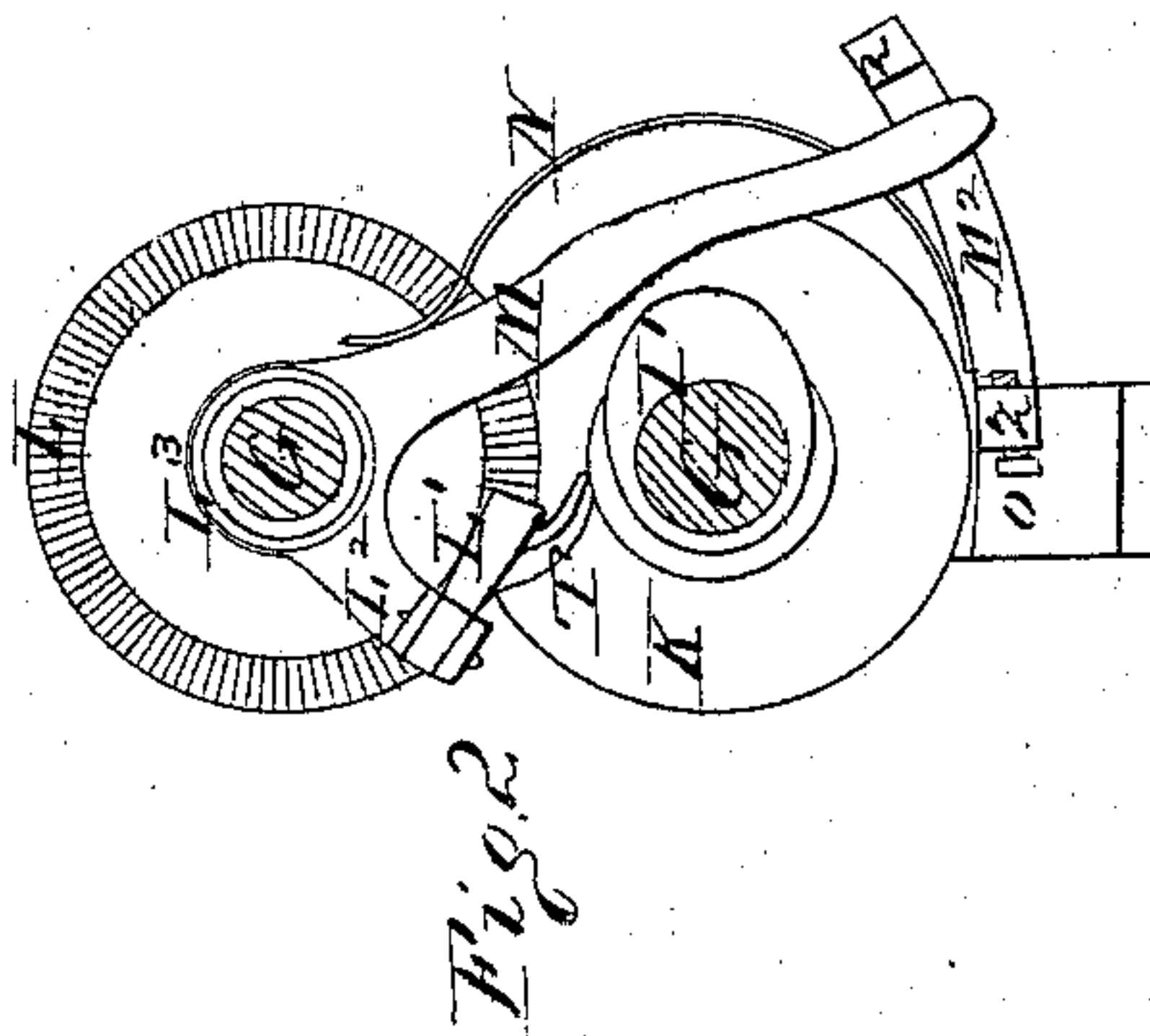


E. J. WORCESTER.
Drilling-Machines.

No. 135,613.

Patented Feb. 4, 1873.



Witnesses.

Geo. E. Phares.

Joe. B. Loomis.

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UNITED STATES PATENT OFFICE.

EDWARD J. WORCESTER, OF WORCESTER, MASSACHUSETTS.

IMPROVEMENT IN DRILLING-MACHINES.

Specification forming part of Letters Patent No. **135,613**, dated February 4, 1873.

To all whom it may concern:

Be it known that I, EDWARD J. WORCESTER, of Worcester, in the county of Worcester and State of Massachusetts, have invented a new and valuable Improvement in Hand-Drills; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawing making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawing is a representation of a side elevation of my invention. Fig. 2 is a detail view of the same.

This invention has relation to hand-drills; and it consists in the construction and novel arrangement of devices for giving the drill-shaft a rotary motion; also, in the construction and novel arrangement of the feed-mechanism, the devices for regulating and those for rapidly reversing the feed, all substantially as hereinafter more fully described.

Referring to the drawing, A designates the frame or bed of the drill, having boxes or bearings D E E¹ F F' to receive the vertical shafts G G', of which the latter is the drill-shaft, and has a socket, g, at its lower end to receive the drill-bit. Keyed to said shafts, between the boxes D E E¹, are the pinion and gear wheels E² E³, the pinion E² being attached to the shaft G. Secured to same shaft is a beveled pinion, H, engaging with and actuated by a beveled spur-wheel, H¹, attached to the shaft of which is a crank-arm, H², used for the purpose of manipulating the drill. This shaft has its bearing in the frame A, and is arranged horizontally, as shown. I designates a balance-wheel on the upper end of the shaft G, and I' an oval cam secured to said shaft below the wheel I. The lower surface of said cam is formed as a clutch-box or provided with clutch-teeth, and engages with a clutch-box or collar, J, formed on the face of a beveled wheel, K, arranged to slide loosely upon the shaft G. This wheel is raised and brought in contact with a similar wheel, K¹, upon the shaft G', by means of a stud, K², sliding in a socket in the upper part of the frame A, and connected to a lever, K³, by means of which said stud is raised and lowered. When said stud is lowered, the

weight of the wheel K causes it to fall and disengage itself from the wheel K¹. Secured to the shaft G' near its upper end is a crown ratchet-wheel, L, which is moved by means of a dog, L¹, pivoted to an arm, L², extending from a loose collar, L³, surmounting the shaft G', as shown. From said collar extends also a long curved arm, M, which is moved by means of the cam I', and the ratchet thereupon turned through the medium of the dog L¹. An arm, M¹, projecting from the top of the frame A holds a spring, N, which, by pressing upon the back of the arm M, causes the dog to be moved back a certain distance when the cam moves away, ready to turn the ratchet at the next action of the cam upon said arm. This arm vibrates between two studs, Z Z', projecting from the end of the arm M², which is a curved extension laterally of the arm M. An adjustable screw, O, passing through one of said studs is adjusted to regulate the reverse stroke of said arm, and to thereby control the distance traveled back by the dog, and consequently the subsequent movement of the ratchet, which is a part of the feed mechanism. As will be observed, the shaft G is in two sections, connected at a point between the boxes EF by means of a feed-screw, P, the thread of which works in a threaded socket of the upper section of the shaft, while the rounded or lower end fits a socket-head, Q, at the top of the lower section. The lower section of the shaft G' is actuated directly from the toothed gearing, while the upper section receives intermittent motion through the ratchet while the drill is boring. This intermittent motion being transmitted to the screw P causes the same to descend and the drill to be fed to its work. The screw is kept from turning by means of a screw, Q, passing through its lower end and traveling between the sides of a slotted plate, R, secured to the frame, as shown. To reverse the feed while the drill is in motion, the wheel K is raised and brought in contact with the wheel K¹, communicating a reverse motion to the drill-shaft. When the wheel K is raised it forces upward an arm, T, depending from the dog, and lifts the latter thereby from the ratchet, allowing the reverse feed to be speedily accomplished from the momentum of the balance-wheel. The wheels K K¹ may be

either toothed, serrated, or frictional gearing. In large machines the frictional gearing is to be preferred. The wheel E^3 has a channeled collar, Y, through which the lower section of the drill-shaft, having a feather, passes and feeds.

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

1. The drill-shaft G' , having its lower section vertically adjustable, and connected to its upper section by means of the feed-screw P, in combination with the crown ratchet-wheel L, dog L^1 , pivoted arms L^2 M, cam I' , and shaft G, substantially as specified.

2. In combination with the gear-wheel K, the stud K^2 sliding in a socket of the frame A, and pivoted to the lever K^3 , by means of which the wheel K is raised and lowered, substantially as set forth.

3. The combination of the spring N, the pivoted arms L^2 M, dog L^1 , and ratchet L, and shaft G, substantially as specified.

4. The combination of the stud Z and adjusting-screw O, with the arms M M^1 , dog L^1 , and ratchet L, substantially as and for the purpose specified.

5. The arm I depending from the dog L^1 , in combination with the adjustable wheel K, wheel K^1 , ratchet-wheel L, and drill-shaft G' , substantially as specified.

6. In a drilling-machine, the shaft G, having an oval cam, I' , with its lower surface recessed to form a clutch-box, substantially as and for the purpose set forth.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

EDWARD J. WORCESTER.

Witnesses:

JAMES H. BANCROFT,
RUSSELL R. SHEPARD.