(No Model.)

C. HOFFMANN.

ELECTRICALLY OPERATED JUMPER DRILL.

No. 509,373. Patented Nov. 28, 1893.

Fig. 1.

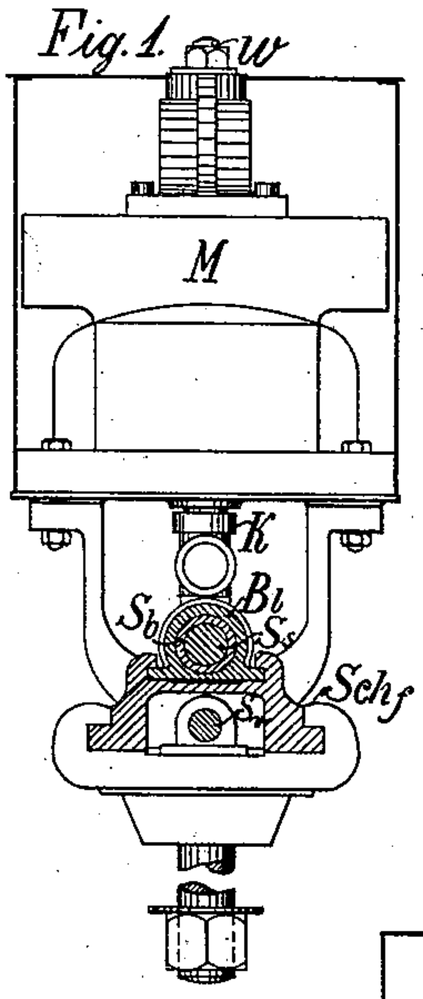


Fig. 6.

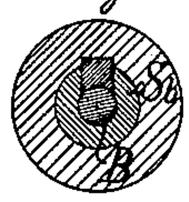


Fig. 4.

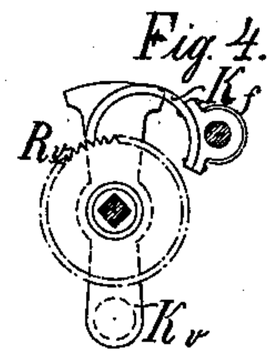


Fig. 5.

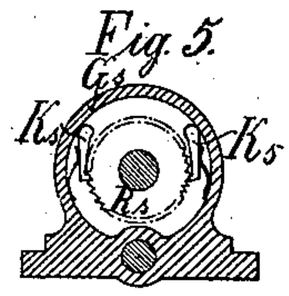


Fig. 2.

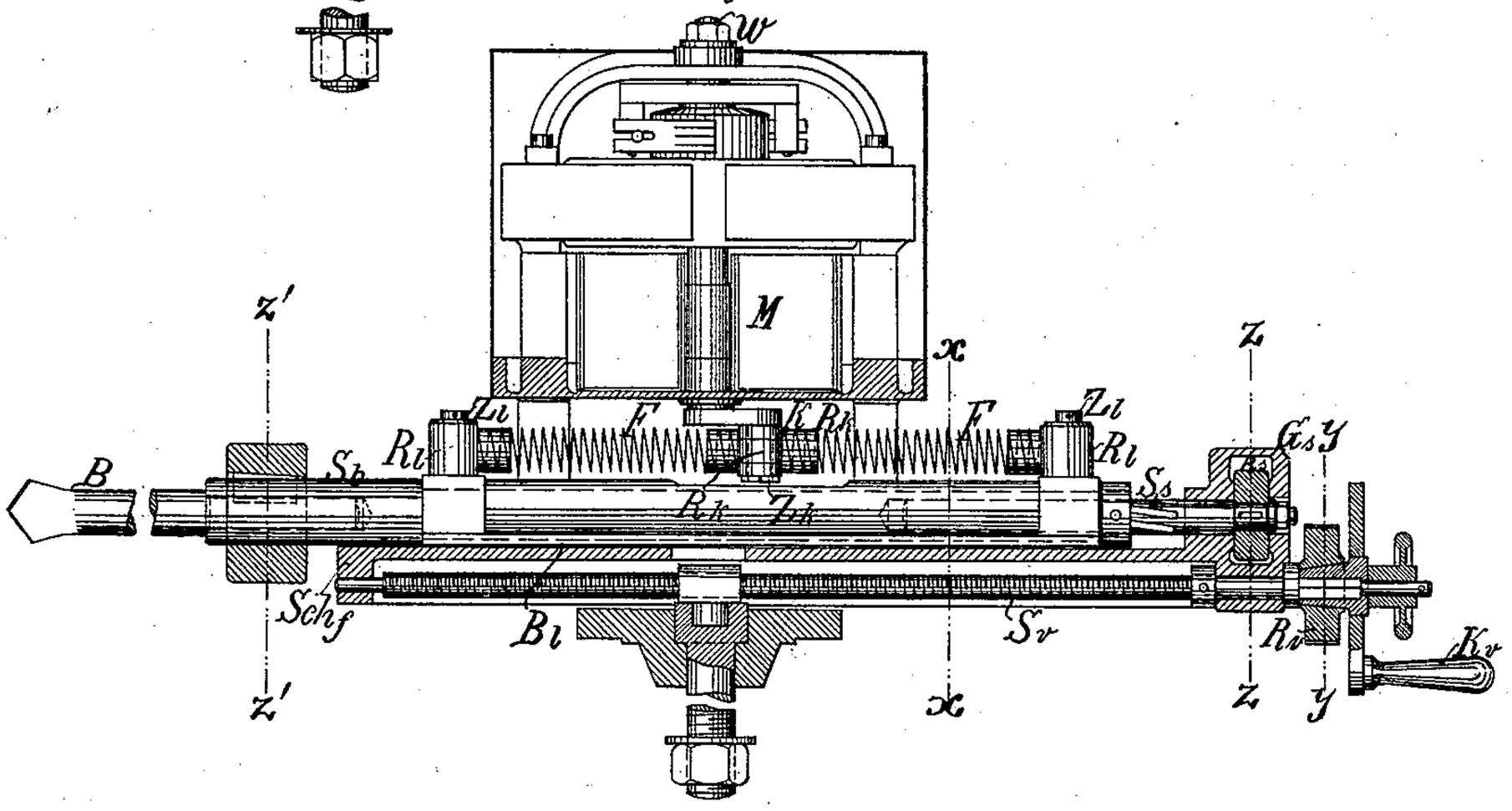
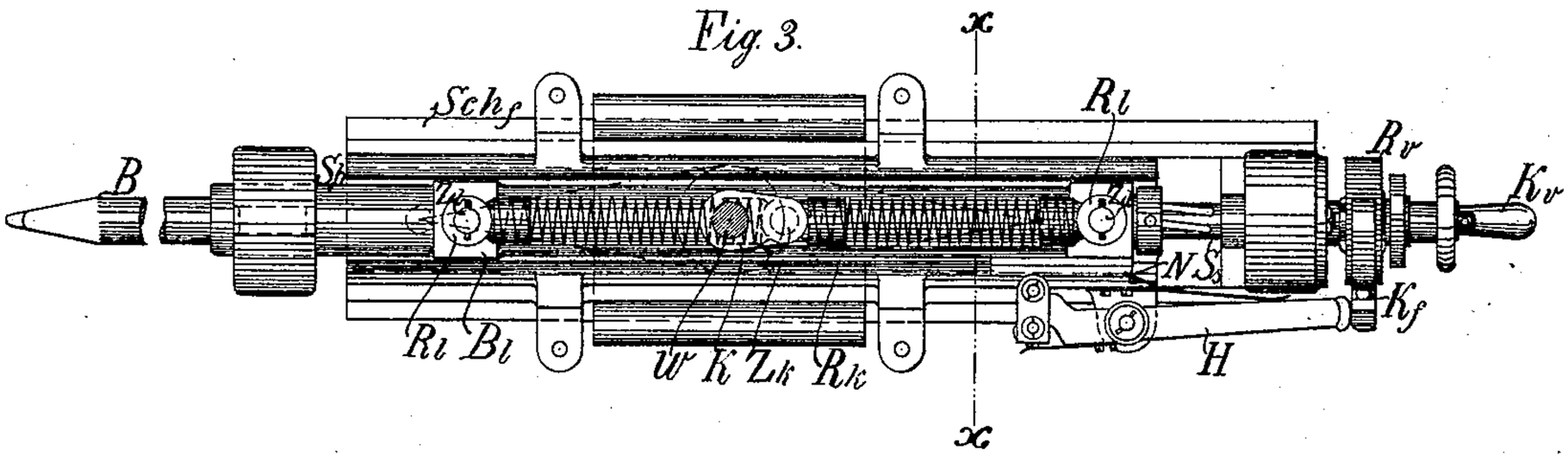


Fig. 3.



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ELECTRICALLY-OPERATED JUMPER-DRILL.

SPECIFICATION forming part of Letters Patent No. 509,373, dated November 28, 1893.

Application filed October 12, 1891. Serial No. 408,517. (No model.) Patented in Germany February 28, 1891, No. 61,039, and in France November 4, 1891, No. 215,917.

To all whom it may concern:

Be it known that I, CARL HOFFMANN, a subject of the Emperor of Germany, residing at Berlin, Prussia, Empire of Germany, have invented certain new and useful Improvements in Electrically-Operated Jumper-Drills, (for which I have obtained Letters Patent in Germany, No. 61,039, dated February 28, 1891; and in France, No. 215,917, dated November 4, 1891,) of which the following is a full, clear, and exact description.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1, is a transverse vertical section of the machine, taken on the line *x*, *x*, in Figs. 2 and 3. Fig. 2, is a vertical longitudinal sectional view of the invention. Fig. 3, is a plan view of the machine with the electro-motor removed and the motor or driving shaft in horizontal section. Fig. 4, is a detail vertical sectional view, taken on the line *y*, *y*, in Fig. 2. Fig. 5, is a transverse sectional view, taken on the line *z*, *z*, in Fig. 2, and Fig. 6, is a detail transverse section, taken on the line *z' z'*, in Fig. 2.

On any suitably arranged swivel head piece adapted for connection to any approved form of tripod or stand not shown in the drawings, is sustained a bed plate S*chf*, which forms a guide for a sliding traveler, or cross-head B', which has suitable bearings in which the drill spindle S*b*, is revolubly held. The drill B, may be fitted to the spindle in any approved manner and may have any length to accommodate the work.

The motor M shown in the drawings is an electric motor which may be of any suitable type and is rigidly held by brackets to the bed plate S*chf*. The motor shaft W which stands vertically directly over the drill spindle S*b* has a crank K on the wrist pin Z*k* of which is loosely held a collar R*k* which carries oppositely arranged lugs to which are suitably held the adjacent ends of spiral springs F F, the other ends of which are held to similar lugs formed on rings or collars R*l* held loosely to pins Z*l* fixed to opposite ends of the traveler B*l*. With this construction, as the motor shaft W, revolves, the traveler will be reciprocated on the bed plate S*chf*, by means of the crank Z*k*, and the springs F, F, which latter thus constitute elastic connections or pitmen between the motor and the reciprocating tool-holding traveler or cross-head B*l*, to force its drill, hammer head or other tool, to the work.

In addition to the reciprocating motion of the drill spindle above mentioned, said spindle is given a partial rotation at each of its reciprocations, and in the following manner: A suitable box or casing G*s*, cast with or fixed to the bed plate S*chf*, provides journal bearings for a screw spindle S*s*, having a series of spiral grooves forming quick-pitched threads, which engage corresponding threads cut within the back end of the drill spindle S*b*. Keyed to the screw spindle S*s*, and within the casing G, is a ratchet-wheel R*s*, which has teeth suitably formed to cause pawls K*s*, K*s*, hung to the casing (see Fig. 5), to allow rotation of the ratchet-wheel and screw spindle in one direction only, and the ratchet-wheel also prevents independent endwise movement of the screw spindle.

As the traveler B*l*, and the drill spindle S*b*, are moved backward toward the casing G, the pawls K*s*, will allow the ratchet-wheel R*s*, to turn freely with the screw spindle S*s*, but on the forward stroke of the traveler, the pawls will prevent turning of the ratchet-wheel and consequently the screw spindle also, and the drill spindle and drill will be turned a distance corresponding to the extent of rotation of the drill spindle on the screw spindle to cause the drill to act at a new place at the base of the hole at every successive stroke.

I am not limited to engagement of the screw spindle with the interior of the drill spindle, in so far as my invention is concerned, as any screw thread connection of these two parts giving intermittent rotation to the tool may be adopted.

In order to feed the drill or tool forward as the drilling or crushing action progresses, I have journaled a feeding screw S*v*, in the bed plate S*chf*. This screw has no endwise motion in the bed plate, and engages a nut on the swivel head piece of the supporting

tripod or frame, and whereby, as the screw is rotated intermittently, the bed plate and all connected operative parts will be moved forward together to advance the drill or tool to the work. This effect may be produced by hand and by the operator rotating the hand crank K*v*, held to the feeding screw, but I prefer to advance the tool or drill automatically. I accomplish this by means of a ratchet-wheel R*v*, which may be held to the feed screw in any approved way, and, as shown in Fig. 2 of the drawings, is tightly engaged by a conical sleeve or collar which is held on a squared portion of the feed screw shaft. To a bearing on the bed plate S*chf*, is fulcrumed a lever H, which at its back end carries a spring pawl K*f*, adapted to engage and turn the ratchet-wheel R*v*. The forward end or part of the lever is adapted for engagement by a nose or projection N, formed on the traveler or cross-head B*l*. This nose is straight for most of its length, but has an oblique or inclined rear portion, which, on the forward stroke of the traveler and drill, pushes the adjacent end or part of the lever H, outward and causes the pawl K*f*, to turn the ratchet-wheel R*v*, and consequently the feed screw S*v*, to thereby advance the bed plate S*chf*, intermittently to feed the drill or tool forward to the work. To diminish shocks of contact, the forward end or part of the lever comprises a hinged piece carrying an antifriction roller on which the traveler nose N, acts. This hinged part is held in normal position by a spring, and yields sufficiently to prevent jar or shock when the inclined face of the nose N, strikes it to actuate the lever. These drill feeding devices are shown in Figs. 3, and 4, of the drawings.

With the mechanisms above described, it is obvious that the drill or tool is reciprocated longitudinally by cushioned and elastic strokes, which carry the tool effectively to the work; and the drill or tool is also rotated axially and is also fed forward as the work progresses, and all three of these movements or functions are performed automatically as the crank of the motor M, is rotated.

While the drawings show an ordinary drill in the spindle or stock S*b*, it is manifest that a hammer, stamp, or other tool may be fitted to the spindle to allow use of the machine in various mining, milling or other kindred operations.

In practicing my invention set forth in the claims hereinafter specified, it is obviously immaterial whether the flexible or elastic pitman connections between the crank K of the electric motor M shown in the drawings, or the crank of any other suitable type or form of motor, and the tool holding traveler, be spiral springs or any other equivalent elastic or yielding medium which will have the same marked effect in elastically modifying the shocks of reciprocation of the spindle upon its engaging screw threaded rotating device and the retaining pawl or pawls therefor. Furthermore, the screw and nut and pawl and ratchet devices which bodily feed forward or adjust the bed plate are also, by the agency of the elastic pitman connections, effectually cushioned against shocks which otherwise would be imparted to them by the reciprocation of the tool spindle carrying traveler. It will therefore be seen that the elastic pitman connections are important features as regards the independent rotation of the tool by the screw device at the tool spindle; the bodily feeding or adjustment of the bed plate, and the conjoint operation of these parts in the production of a smooth working and durable drilling machine of the character herein described.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In a drilling machine of the character described, the combination with a bed plate, a traveler thereon, a drill or tool holding spindle on the traveler, a device screw-threaded to the tool spindle and having a ratchet and one or more pawls allowing the spindle to turn only in one direction, a motor driving crank, and flexible or elastic pitman connections interposed directly between the crank and the traveler, substantially as described, for the purposes set forth.

2. In a drilling machine of the character described, the combination with a bed plate, a traveler thereon, a drill or tool holding spindle on the traveler, a device screw-threaded to the tool spindle and having a ratchet and one or more pawls allowing the spindle to turn only in one direction, a motor driving crank, and spiral springs interposed directly between the crank and the traveler, substantially as described for the purposes set forth.

3. In a drilling machine of the character described, the combination with a bed plate carrying a feed screw, a nut on the supporting frame engaged by said screw, a ratchet wheel on said screw, a lever on the bed plate carrying a pawl engaging the feed screw ratchet wheel, a reciprocating tool carrying traveler on the bed plate and actuating the lever, a motor crank, and flexible or elastic pitman connections interposed directly between the crank and the traveler, substantially as described, for the purposes set forth.

4. In a drilling machine of the character described, the combination with a bed plate carrying a feed screw, a nut on the supporting frame engaged by said screw, a ratchet wheel on said screw, a lever on the bed plate carrying a pawl engaging the feed screw ratchet wheel, a reciprocating tool carrying traveler on the bed plate and actuating the lever, a motor crank, and spiral springs connecting the crank and the traveler, substantially as described, for the purposes set forth.

5. In a drilling machine of the character described, the combination with a bed plate carrying a feed screw, a nut on the supporting frame engaged by said screw, a ratchet

wheel on said feed screw, a lever on the bed plate carrying a pawl engaging the feed screw ratchet wheel, a traveler on the bed plate actuating the feed screw lever, a drill or tool holding spindle on the traveler, a device screw-threaded to the tool spindle and having a ratchet and one or more pawls allowing the spindle to turn only in one direction, a motor driving crank, and flexible or elastic pitman connections between the crank and the traveler, substantially as described, for the purposes set forth.

6. In a drilling machine of the character described, the combination with a bed plate carrying a feed screw, a nut on the supporting frame engaged by said screw, a ratchet wheel on said feed screw, a lever on the bed plate carrying a pawl engaging the feed screw ratchet wheel, a traveler on the bed plate actuating the feed screw lever, a drill or tool carrying spindle on the traveler, a device screw-threaded to the tool spindle and having a ratchet and one or more pawls allowing the spindle to turn only in one direction, a motor driving crank, and spiral springs connecting the crank and the traveler, substantially as described, for the purposes set forth.

In testimony whereof I affix my signature.

CARL HOFFMANN.

Witnesses:

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