No. 649,464. Patented May 15, 1900.

E. LAWSON.

ROCK DRILL.

(Application filed Dec. 23, 1898.)

(No Model.)

FIG. 1.

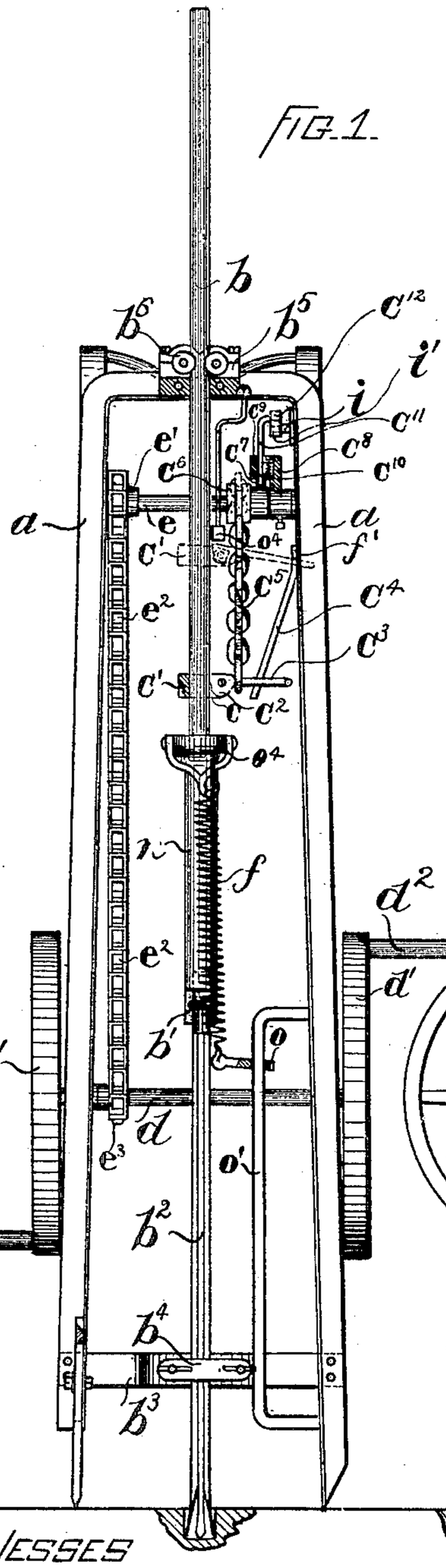


FIG 2

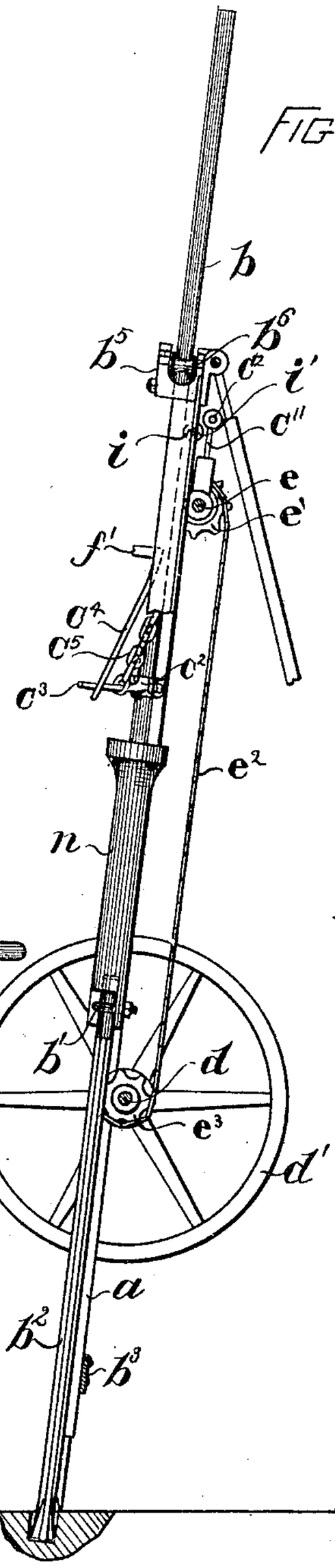


FIG. 3.

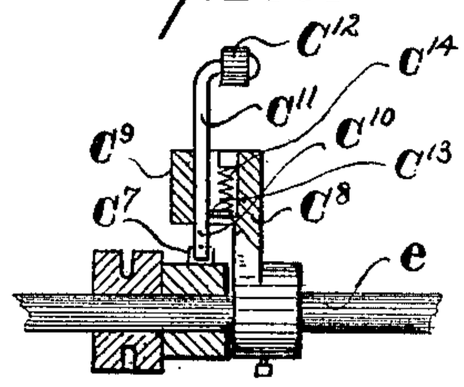


FIG. 4.

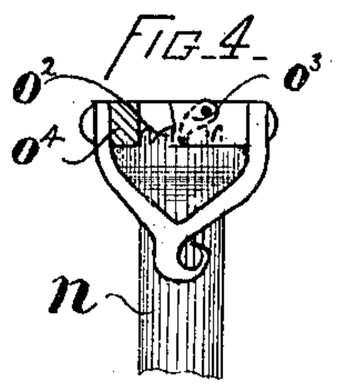
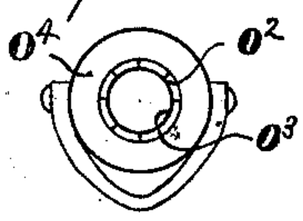


FIG. 5.



WITNESSES
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UNITED STATES PATENT OFFICE.

EMANUEL LAWSON, OF BREWER, MAINE.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 649,464, dated May 15, 1900.

Application filed December 23, 1898. Serial No. 700,145. (No model.)

To all whom it may concern:

Be it known that I, EMANUEL LAWSON, a citizen of the United States of America, and a resident of Brewer, Penobscot county, State of Maine, have invented certain new and useful Improvements in Rock-Drills, of which the following is a specification.

This invention relates to rock-drills of that class which is operated by hand-power, and has for its object to improve the construction and arrangement of the parts thereof.

In accordance with this invention a frame is provided, and a drill-bar is constructed and arranged to work up and down therein, having secured thereto a drill, and mechanism is provided to operate said drill consisting of a clutch to engage said drill-bar, a device to raise said clutch and drill-bar held by it, a device for turning said drill as it is raised, means for disengaging said clutch from said drill-bar when said drill drops to deliver a blow, a spring to quicken and increase the force of said blow, a device for advancing said spring as said drill is fed ahead, and means for moving said clutch and clutch-raising device into position to engage and raise said drill-bar while said drill is delivering a blow.

Figure 1 is a front elevation of a rock-drill embodying this invention. Fig. 2 is a side elevation of the rock-drill shown in Fig. 1, with a part of one leg removed. Fig. 3 is an elevation in section of a part of the mechanism for raising the drill to be referred to. Fig. 4 is a side elevation of a part of the drill-bar, showing a ratchet-and-pawl device to be referred to; and Fig. 5 is a plan view of the parts shown in Fig. 4.

The letter a denotes the frame of the rock-drill, shown in the drawings as made of angle-iron for strength and lightness, and b the drill-bar arranged to work up and down in said frame a between the two legs thereof, having its lower end cut away for a clamp b', which detachably secures a drill b^2 to said drill-bar b. Two bearings are provided in which said drill-bar b and drill b^2, secured thereto, are adapted to work, one arranged near the lower end of said frame a and the other secured to the upper end thereof, and said bearing near the lower end of said frame a, through which said drill b^2 loosely passes, acts as a guide therefor and is formed in a cross-brace b^3 of said frame a, and a detachable plate b^4 is provided and secured thereto, so that said drill b^2 may be quickly removed when desired and another put in its place. Said bearing at the upper end of the machine is secured to said frame a thereof and consists of a block having journaled therein two antifriction-rollers b^6, having grooved or concave surfaces between which said drill-bar b works, the object of said antifriction-rollers b^6 being to reduce friction between said drill-bar b and said bearing without the necessity of lubricating said drill-bar b, as would be necessary if a bearing of common construction was employed. The device for raising said drill b^2 consists of a clutch c, constructed and arranged to engage said drill-bar b, and said clutch c may be formed of a strap c', embracing said drill-bar b and a lever c^2, pivoted to said strap c' and adapted to frictionally engage and clamp said drill-bar b in said strap c', as shown in Figs. 1 and 2. Said lever c^2 is provided with a shank portion c^3, adapted to engage a rod or guide c^4, set at an angle with one leg of said frame a to turn said drill b^2 as it is raised, as shown in Figs. 1 and 2. To operate said drill b^2, a main shaft d is provided and arranged to turn in bearings secured to the legs of said frame a, having mounted thereon wheels d', having handles to rotate said shaft d to furnish power, and said wheels d' may be arranged one at each side of said frame a of the machine, as shown in Fig. 1. A sprocket-wheel e^3 is mounted upon said main shaft b, carrying a sprocket-chain e^2, through which power is conveyed from said driving-shaft d to a shaft e, upon which a similar sprocket-wheel e' is mounted, over which said sprocket-chain e^2 passes, and said shaft e is located in said frame a above said main shaft d and turns in bearings secured to the legs of said frame a. The mechanism for raising said drill b^2 and thereafter releasing it when it drops to deliver a blow, as will be described, consists of a drum c^6, free to revolve upon said shaft e, having secured thereto one end of a chain or belt c^5, adapted to be wound thereon, the other end of which being secured to said shank c^3 of said lever c^2 of said clutch c, and said drum c^6 has formed upon the outside surface thereof a projection c^7. A block c^8 is secured to

said shaft e, having a portion c^9 projecting over the circumference of said drum c^6, through which a pin c^{10} passes, projecting into the path of said projection c^7, formed upon said drum c^6, so that when said shaft e revolves said block c^8, secured thereto, also turns therewith, moving said pin c^{10} into engagement with said projection c^7, formed upon said drum c^6, which being free to turn revolves with said shaft e, winding upon itself said belt or chain c^5, which raises said clutch c, attached to the other end of said chain c^5, and drill-bar d engaged by it. Said clutch c is supported in its normal position by said chain c^5 and held out of parallel with said shaft e by said guide-rod c^4, which engages said shank portion c^3 of said clutch c, as shown in Figs. 1 and 2, so that as said clutch c is raised said shank portion c^3 thereof moves along said guide-rod c^4, being held in engagement therewith by said chain c^5, as shown in Fig. 2, turning said clutch c and drill-bar engaged by it axially a part of a revolution as it is raised. To disengage said drill-bar b from said clutch c, a tripping-pin f' is secured to one leg of said frame a and arranged in the path of said clutch c as it is raised by said belt or chain c^5, so that said shank portion c^3 of said clutch c will come up against said tripping-pin f' just before said clutch c reaches its highest elevation, whereupon further upward movement of said shank portion c^3 is arrested, and said lever c^2, turning on its pivot, as shown by dotted lines, Fig. 1, releases said drill-bar b, when it drops to deliver a blow. As said clutch c is disengaged from said drill-bar b the weight thereof reacts upon said clutch c, causing it to spring upwardly, and to hold said clutch c in place and prevent it from springing out of position as it releases said drill-bar a stop o^4 is provided, projecting downwardly from said frame a and occupying a position directly above said clutch c. To move said clutch c into position to engage and raise said drill-bar b after it drops to deliver a blow, said pin c^{10} is disengaged from said projection c^7, formed upon said drum c^6, by means to be described, when the latter being free to revolve upon said shaft e the weight of said chain or belt c wound upon said drum c^6 and the weight of said clutch c causes it to drop by gravity into position to raise said drill. To disengage said pin c^{10} from said projection c^7, so that said drum c^6 may revolve to its normal position upon said shaft e, a tripping-arm i is secured to one leg of said frame a of the machine, having mounted thereon an antifriction-roller i', and said pin c^{10} is constructed and arranged to pass up through said projecting portion c^9 of said block c^8, and said pin c^{10} may have its end bent at right angles thereto, upon which is mounted an antifriction-roller c^{12}, and a stud projecting from said pin c^{10} is adapted to engage a spiral spring c^{14}, located in an aperture in said block c^8 to normally press said pin c^{10} into position to engage said projection c^7, formed upon said drum c^6. Said pin c^{10} is arranged so that once each revolution of said shaft e said roller c^{12}, mounted upon said pin c^{10}, will engage said roller i', mounted upon said tripping-arm i, which raises said pin c^{10} out of engagement with said projection c^7, formed upon said drum c^6, allowing the latter to revolve to its normal position upon said shaft e. To increase the power of said drill b^2 as it drops to deliver a blow, said drill-bar b may be weighted by having a portion n of large diameter, and to quicken the stroke and further increase the power of a blow a spiral spring f may be employed, one end of which may be attached to the upper end of said weighted portion n of said drill-bar b and the other end thereof may be secured to a clutch o, engaging a guide-rod o', secured to said frame and arranged substantially parallel with said drill-bar b, and said clutch o is adapted to grip said guide-rod o' as said drill-bar b is raised against the action of said spring f, and said clutch o is arranged to move forward upon said rod o' as said drill b^2 is fed ahead, so that the action of said spring f will be uniform as said drill advances. Each time said drill b^2 is raised said shank portion c^3 of said clutch c, engaging said guide-rod c^4, turns said clutch c and drill-bar b, held by it, a part of a revolution, so that said drill b^2 will cut a circular hole in the rock to be drilled, and to prevent said drill b^2 from turning back as it drops to deliver a blow or from the jar or shock from coming in contact with the rock to be drilled a crown-ratchet o^2 is formed around the top of said weighted portion n of said drill-bar b and a pawl o^3, secured to a swivel or collar o^4, embracing said weighted portion n of said drill-bar b, so that as said drill-bar b turns said pawl o^3 will successively engage the teeth of said ratchet o^2 and prevent said drill b^2 from turning back.

The operation of the drill is as follows: The parts thereof being in the position taken by them after said drill-bar has dropped to deliver a blow, as shown in Figs. 1 and 2, power is supplied to revolve said main shaft d, which is communicated through said sprocket-chain e^2 to said shaft e, which revolves, carrying with it said block c^8, and said pin c^{10} engages said projection c^7, formed upon said drum c^6, which is revolved, winding thereon said chain or belt c^5, which raises said clutch c, secured thereto, and said drill-bar b, engaged by it, against the action of said spring f, said shank portion c^3 of said clutch c engaging said guide-rod c^4, which being set at an angle with said frame a turns said clutch c axially as it is raised, turning said drill b^2 and drill-bar b, engaged by it. Just before said clutch c reaches its highest elevation farther upward movement of said shank portion c^3 is arrested by coming in contact with said tripping-pin f', which releases said drill-bar b, when it drops by gravity and the pull of said spring f to deliver a blow upon the rock to be drilled. As

said drill b^2 drops, the upper end of said pin c^{10} engages said tripping-arm i, which lifts said pin c^{10} out of engagement with said projection c^7, formed upon said drum c^6, when the latter revolves by gravity to its normal position upon said shaft e, moving said pin c^7 to a position in front of said pin c^{10} and said clutch c into a position to raise said drill-bar b, and said shaft e continuing to revolve moves said pin c^{10} into engagement with said projection c^7 to again raise said drill b^2.

I claim—

1. In a rock-drill, a frame, a drill-bar carrying a drill and adapted to operate in the frame, a clutch adapted to operate the drill-bar, a drum, a belt or chain having one end connected with the clutch and the other end with the drum, said drum adapted to revolve with the shaft to wind the belt or chain thereon and operate the clutch to engage and raise the drill-bar, and to revolve on the shaft in the reverse direction to unwind the belt or chain and lower the clutch, means for adapting the drum to revolve on or with its shaft, means for operating the drum, and means for releasing the drill-bar from the clutch, substantially as described.

2. In a rock-drill, a frame, a drill-bar carrying a drill and adapted to operate in the frame, a clutch adapted to operate the drill-bar, means for operating the clutch consisting of a shaft mounted in the frame, a drum adapted to revolve on or with the shaft and having a projection, an arm or block secured to the shaft and carrying a pin, said pin adapted to engage the projection on the drum to revolve the drum with the shaft, and to be disengaged from the projection to allow the drum to revolve independently of the shaft, and means for operating the drum, substantially as described.

3. In a rock-drill, a frame, a drill-bar carrying a drill and adapted to operate in the frame, a clutch adapted to operate the drill-bar, a drum, a belt or chain having one end connected with the clutch and the other end with the drum, said drum adapted to revolve with the shaft to wind the belt or chain thereon and operate the clutch to engage and raise the drill-bar, and to revolve on the shaft in the reverse direction to unwind the belt or chain and lower the clutch, means for adapting the drum to revolve on or with its shaft, means for operating the drum, means for turning the clutch and drill-bar axially, means for preventing the drill-bar from turning backward as it drops, and means for releasing the drill-bar from the clutch, substantially as described.

4. In a rock-drill, a frame, a drill-bar carrying a drill and adapted to operate in the frame, a clutch, means for operating the clutch to engage and raise the drill-bar, means for releasing the drill-bar from the clutch, a guide-rod secured to the frame, a clutch adapted to engage the guide-rod and free to move along the same, and a spring adapted to quicken the action of the drill-bar having one end secured to the drill-bar and the other end to the clutch, substantially as described.

5. In a rock-drill, a frame, a drill-bar carrying a drill and adapted to operate in the frame, a guide-rod secured to the frame, a clutch adapted to engage the guide-rod and free to move along the same, a spring adapted to quicken the action of the drill-bar having one end secured to the drill-bar and the other end to the clutch, means for raising the drill-bar against the action of said spring, and means for releasing the drill-bar, substantially as described.

6. In a rock-drill, a frame, a drill-bar arranged to work therein, a drill, a clutch to engage, raise and release said drill-bar, a shaft, a drum free to turn thereon, a projection formed on said drum, a belt or chain connecting said drum with said clutch, a block secured to said shaft, a pin arranged in said block to engage said projection to revolve said drum and means for moving said pin out of engagement with said projection whereupon said drum revolves, and said clutch supported thereby moves into position to raise said drill-bar, substantially as described.

7. In a rock-drill, a frame, a drill-bar carrying a drill adapted to operate in the frame, a clutch, a drum mounted on a shaft in the frame adapted to operate the clutch, means for adapting the drum to revolve on or with its shaft, means for operating the drum, a stop to limit the upward movement of the clutch, and means for releasing the drill-bar from the clutch, substantially as described.

8. In a rock-drill, a frame, a drill-bar carrying a drill and adapted to operate in the frame, a clutch adapted to operate the drill-bar, means for operating the clutch consisting of a shaft mounted in the frame, a drum adapted to revolve on or with the shaft and having a projection, an arm or block secured to the shaft and carrying a pin adapted to work therein, said pin adapted to engage the projection on the drum to revolve the drum with the shaft, and to be disengaged from the projection to allow the drum to revolve independently of the shaft, and means for operating the drum, substantially as described.

Signed by me at Bangor, Maine, this 17th day of December, 1898.

EMANUEL LAWSON.

Witnesses:

WILLIAM B. PEIRCE,

HARRY O. ROBINSON.