(No Model.)

S. HUSSEY.

ROCK DRILL MACHINE.

No. 339,103. Patented Mar. 30, 1886.

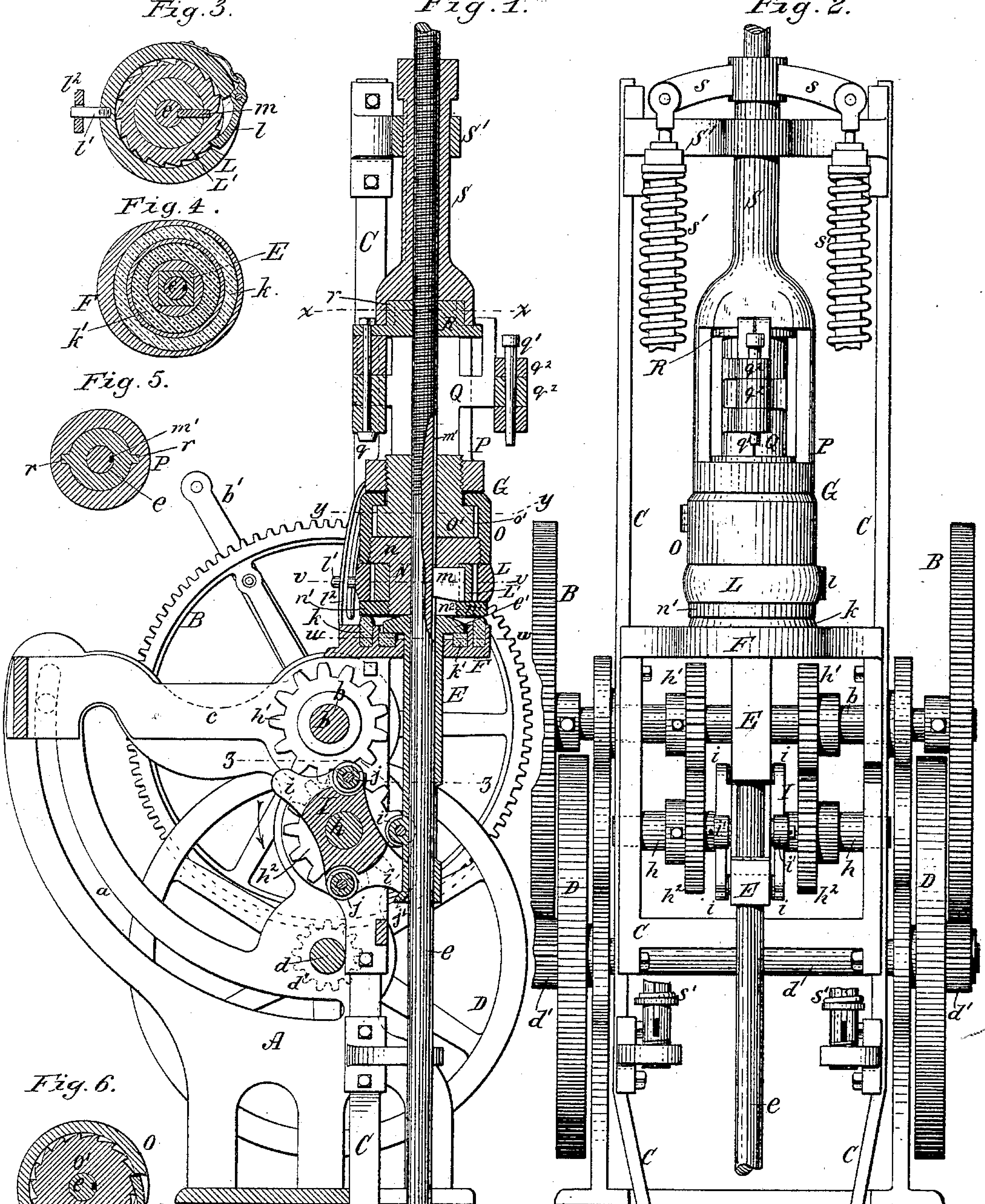
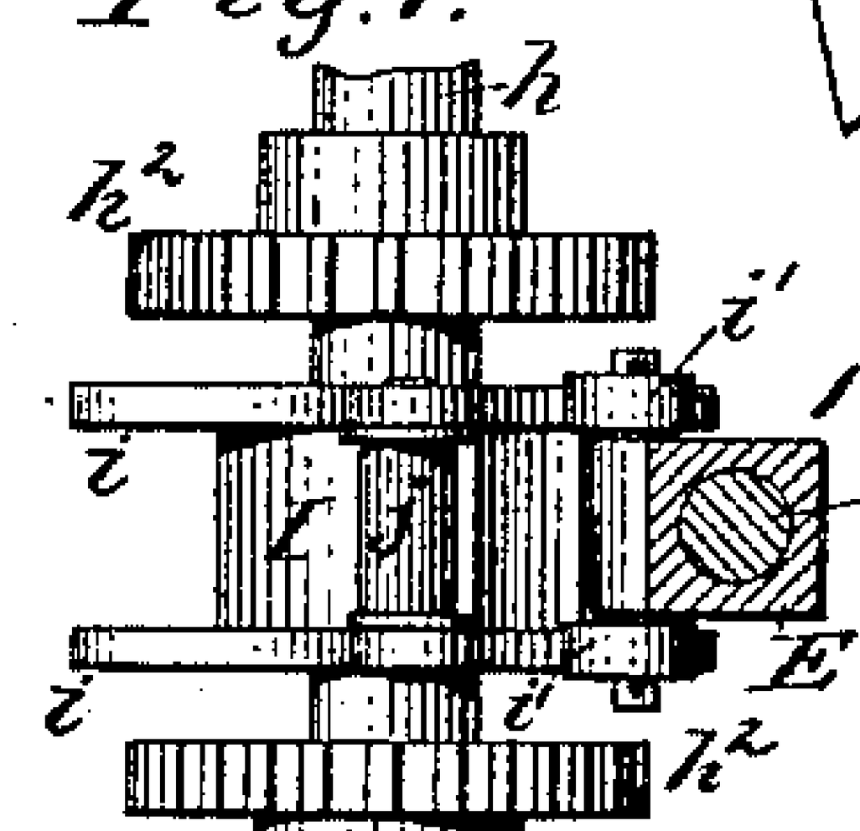


Fig. 7.



Chas. J. Buchheit.
Theo. L. Popp.
Witnesses.

Inventor:
S. Hussey.
By Wilhelm & Bonner.
Attorneys.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

SILVANUS HUSSEY, OF BUFFALO, NEW YORK.

ROCK-DRILL MACHINE.

SPECIFICATION forming part of Letters Patent No. 339,103, dated March 30, 1886.

Application filed December 2, 1885. Serial No. 184,397. (No model.)

To all whom it may concern:

Be it known that I, SILVANUS HUSSEY, of the city of Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Rock-Drills, of which the following is a specification.

This invention relates to an improvement in that class of rock-drills in which the clutch-head and drill-bar are raised by a revolving driving-head.

In a former application for patent, filed November 26, 1884, No. 148,883, I have described a construction in which the driving-head actuates the drill-bar by means of a rock-lever interposed between the driving-head and the sleeve of the clutch-head.

The object of the present invention is to render the machine more simple and compact by omitting this rock-lever, and causing the driving-head to operate directly upon a sleeve which embraces the drill-bar and bears with its upper end against the clutch-head.

Another object of this invention is to simplify the construction of the clutch-head and connecting parts of the feed mechanism in such manner as to render this portion of the machine more compact and reduce the height of the machine.

My invention consists, to these ends, of the improvements which will be hereinafter fully set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical section of my improved rock-drill. Fig. 2 is a front elevation thereof. Figs. 3, 4, 5, and 6 are horizontal sections in lines *v v*, *w w*, *x x*, and *y y*, Fig. 1, respectively. Fig. 7 is a top plan view of the driving mechanism in line *z z*, Fig. 1.

Like letters of reference refer to like parts in the several figures.

A represents the upper portion of the stationary frame of the machine, having each of its side pieces provided with a segmental slot, *a*, in the usual manner.

b represents the horizontal driving-shaft, journaled in the main frame A, and provided at both ends with hand-cranks *b'* and gear-wheels B.

C represents the adjustable drill-frame, hung on the driving-shaft *b*, and having its lower portion provided with a rearwardly-extending arm, *c*, which is adjustably secured to the main frame A by bolts passing through the slots *a*, in the usual manner.

d is the horizontal fly-wheel shaft, journaled in the main frame A below the driving-shaft, and provided with fly-wheels D and with pinions *d'*, which mesh with the gear-wheels B.

e represents the drill bar or rod, which is supported in the drill-frame C, and E is a sleeve which surrounds the drill-bar and extends below the lower head, F, of the drill-frame. The sleeve E is made square in cross-section and fitted to slide in a square opening of the head F; or it may be made cylindrical and be prevented from turning in the head F by a groove and feather or other suitable means.

G represents the clutch-head, which embraces the drill-bar above the head F, and which is lifted by the sleeve E, the latter being provided at its upper end with an enlarged head, *e'*, which bears against the under side of the clutch-head.

h represents a horizontal counter-shaft journaled in the drill-frame C below the driving-shaft *b*, and *h' h²* represent gear-wheels whereby the shafts *b* and *h* are geared together.

I represents the driving-head, secured to the counter-shaft *h* to rotate therewith and lift the drill-bar by engaging with the sleeve E. The driving-head I is provided with primary lifting or starting arms *i*, which straddle the sleeve E and engage against the under side of rollers *i'*, attached to the rear side of the sleeve E at a short distance above its lower end. The driving-head is also provided with secondary lifting-rollers *j*, each of which is arranged with reference to the direction in which the driving-shaft rotates, in rear of the pair of lifting-arms *i*, in connection with which the roller operates. The rollers *j* engage against the lower end of the sleeve E, which latter is preferably provided with a rearwardly-projecting nose, *j'*, which forms an enlarged bearing-surface for the rollers.

In rotating the driving-head in the direction of the arrow in Fig. 1, the primary lifting-arms *i* first engage against the under sides of the rollers *i'* and lift the sleeve E, clutch-head G, and drill-bar *e*, thereby compressing the springs by which the blow is delivered.

Before the rotative motion of the arms *i* disengages the latter from the rollers *i'*, the secondary lifting-roller *j* next following the arms *i* engages against the nose *j'* of the sleeve E, and continues the upward movement of the sleeve E and connecting parts until the roller *j* disengages itself from the sleeve E, when the drill-bar descends under the pressure of the springs. The roller *j* is arranged nearer the center of rotation of the driving-head I than the bearing-surfaces of the arms *i*, so that the first portion of the compressing movement is faster than the last portion, whereby the leverage with which the springs are compressed is increased during the last portion of the compressing movement, during which the resistance of the partially-compressed spring is greater than during the first portion of said movement.

The driving-head I is provided with two sets of lifting-arms *i* and rollers *j*, arranged on diametrically-opposite sides of the shaft *h*, so that each revolution of the driving-head lifts the drill-bar twice, the space between each roller *j* and the next following lifting-arms *i* on the driving-head being sufficient to permit the drill-bar and sleeve E to drop under the pressure of the springs.

k k' represent two concentric rings of rubber seated in the upper side of the head F around the drill-bar. The outer ring, *k*, receives the impact of the clutch-head G, and the inner ring, *k'*, that of the sleeve E.

L represents the pawl-ring of the clutch-head G, provided with a spring-pawl, *l*, and a pin, *l'*, which engages in a curved slotted feed-guide, *l²*, secured to the head F.

L' represents the ratchet-ring, arranged within the pawl-ring L, which latter turns the ring L' in one direction by the pawl *l*. The ratchet-ring L' is arranged concentric with the drill-bar *e*, and is provided in its bore with a feather or rib, *m*, which projects into a longitudinal groove, *m'*, formed in the drill-bar, whereby the latter is rotated by the ratchet-ring and the drill-bar fed down by the feed-screw. The latter surrounds the body N of the clutch-head and turns on the same. The body N is provided above the ratchet-ring with a collar, *n*, and below the same with a screw-collar, *n'*, between which the ratchet and pawl rings turn. By unscrewing the collar *n'* the rings L L' can be removed from the clutch-head. The body N is provided with a slot, *n²*, through which the feather *m* passes.

O is a tubular cap, which is screwed upon the collar *n* of the body N, and which rests on a flanged sleeve, O', which surrounds the drill-bar above the body N. The tubular cap O is provided with a spring-pawl, *o*, and the sleeve O' is provided with a ratchet-rim, *o'*, with which said pawl engages. These parts are so arranged that they permit the clutch-head and drill-bar to turn in the direction of the feed, but prevent them from turning in an opposite direction.

P represents an open frame, which contains the divided nut Q, in which the upper threaded portion of the drill-bar works. The frame P is screwed with its lower end to the upper end of the sleeve *o'*. The parts of the vertically-divided nut Q are pivoted by a vertical bolt, *q*, to a supporting-cap, R, which surrounds the drill-bar, and is seated in a socket in the upper portion of the frame P, in which the cap is held against turning by ribs or projections *r*, formed on the cap and entering recesses in the frame P. The two parts of the divided nut are secured together by a lock-bolt, *q'*, passing through ears *q²*, formed on the two parts of the nut. The upper end of the frame P terminates in a sleeve, S, which surrounds the drill-bar, and is guided in a cross-head, S', of the drill-frame. The upper end of the sleeve S is provided with arms *s*, which connect with the springs *s'*, which are supported on the drill-frame. Upon raising the sleeve E by the rotation of the driving-head I, the clutch-head G, drill-bar *e*, and frame P, with its sleeve S and arms *s*, are raised also, thereby compressing the springs *s'*. When the driving-head releases the sleeve E, these parts are forced down by the reaction of the springs *s'*.

The clutch-head G, constructed as described, with the frame P, divided nut Q, and sleeve S, forms a very compact feeding mechanism, which materially reduces the height of the machine. The actuating mechanism by which the drill-bar is raised is brought closely to the drill-bar, whereby this part of the machine is also rendered very compact.

I claim as my invention—

1. The combination, with the drill-bar and clutch-head, of a rotating driving-head provided with primary lifters *i* and a secondary lifter, *j*, and a reciprocating sleeve or carrier, E, surrounding the drill-bar and bearing against the clutch-head, and provided with bearings against which the lifters *i* and *j* engage successively in lifting the sleeve or carrier and the drill-bar, substantially as set forth.

2. The combination, with the drill-frame, drill-bar, and clutch-head, of a rotating driving-head provided with primary lifting-arms *i* and a secondary lifting-roller, *j*, and a sleeve, E, having a reciprocating motion in the drill-frame, while being prevented from turning, and provided with bearings *i'* and *j'*, against which the arms *i* and the roller *j* engage successively in lifting the sleeve and the drill-bar, substantially as set forth.

3. The combination, with the drill-bar and drill-frame, of a clutch-head, G, capable of turning with and on the drill-bar, and a lifting-sleeve, E, having a vertical reciprocating movement in the drill-frame, and held in the drill-frame against turning with the drill-bar, substantially as set forth.

4. The combination, with the drill-bar, clutch-head G, and detached lifting-sleeve E, of a drill-frame provided with a head, F, hav-

ing two concentric cushion-rings, *k k'*, on which the clutch-head G and lifting-sleeve are cushioned separately, substantially as set forth.

5. The combination, with the drill-frame and the drill-bar, having a longitudinal groove, *m'*, of the flanged clutch-head body N, provided at its lower end with a removable collar, *n'*, the ratchet-ring L', provided with a feather, *m*, entering the groove *m'*, the pawl-ring L, provided with a pawl, *l*, and pin *l'*, and the curved feed-guide l^2, secured to the drill-frame, substantially as set forth.

6. The combination, with the drill-bar provided with a longitudinal groove, *m'*, and the drill-frame, of the clutch-head body N, the pawl-ring L, the ratchet-ring L', provided with a feather, *m*, the tubular cap O, secured to the body N and provided with pawl *o*, the sleeve O', on which the cap O loosely rests, and which is provided with a ratchet-rim, *o'*, the frame P, secured to the sleeve O', the supporting-cap R, held in the frame P against turning, and the divided nut Q, having its parts pivoted to the cap R in the frame P, substantially as set forth.

Witness my hand this 17th day of July, 1885.

SILVANUS HUSSEY.

Witnesses:

JNO. J. BONNER,

OSCAR SCHAUB.