No. 840,816.

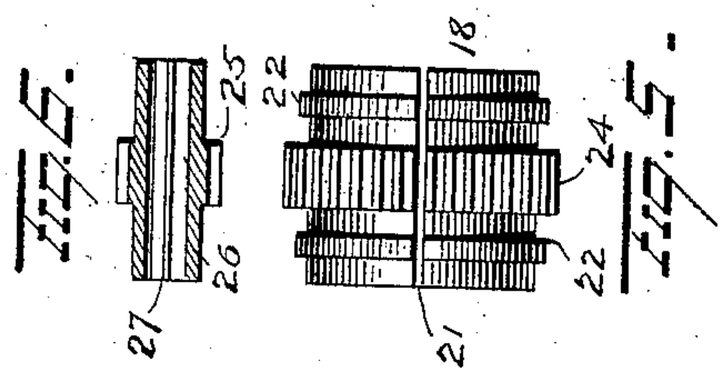
PATENTED JAN. 8, 1907.

T. E. ADAMS.

ROCK DRILL.

APPLICATION FILED OCT. 24, 1901.

4 SHEETS—SHEET 1.



WITNESSES

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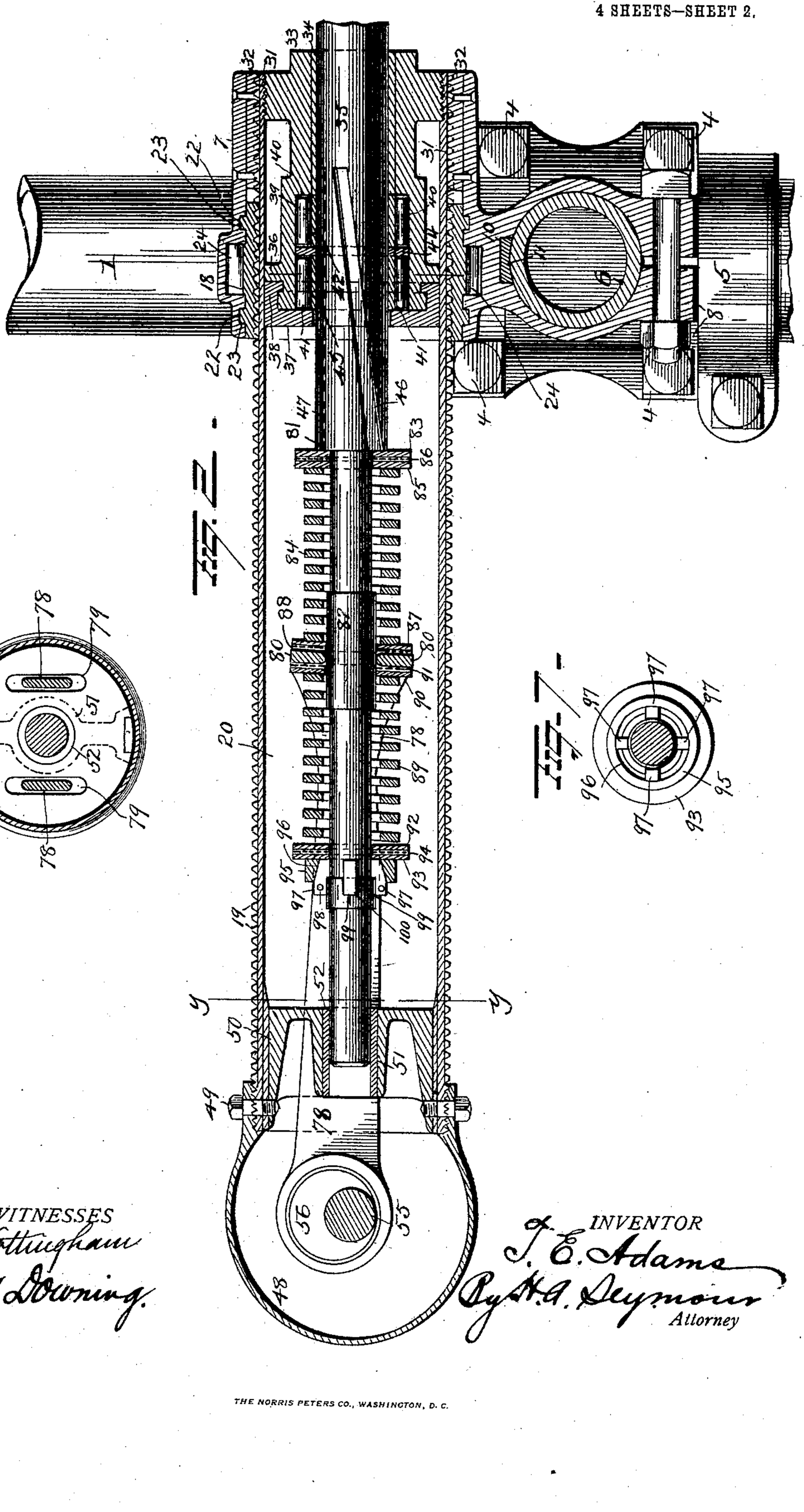

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4 SHEETS—SHEET 3.

Fig. 8.

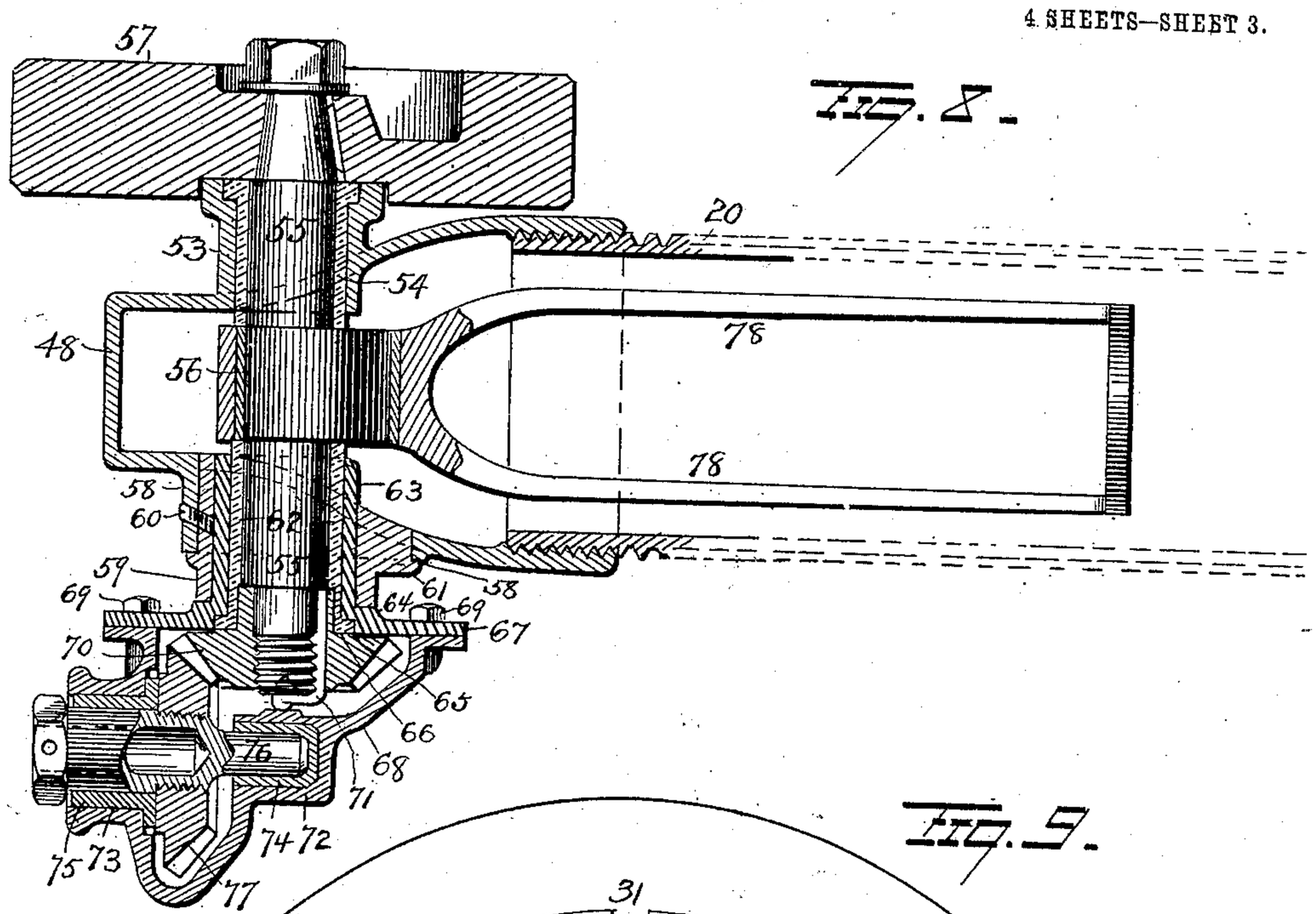

Fig. 9.

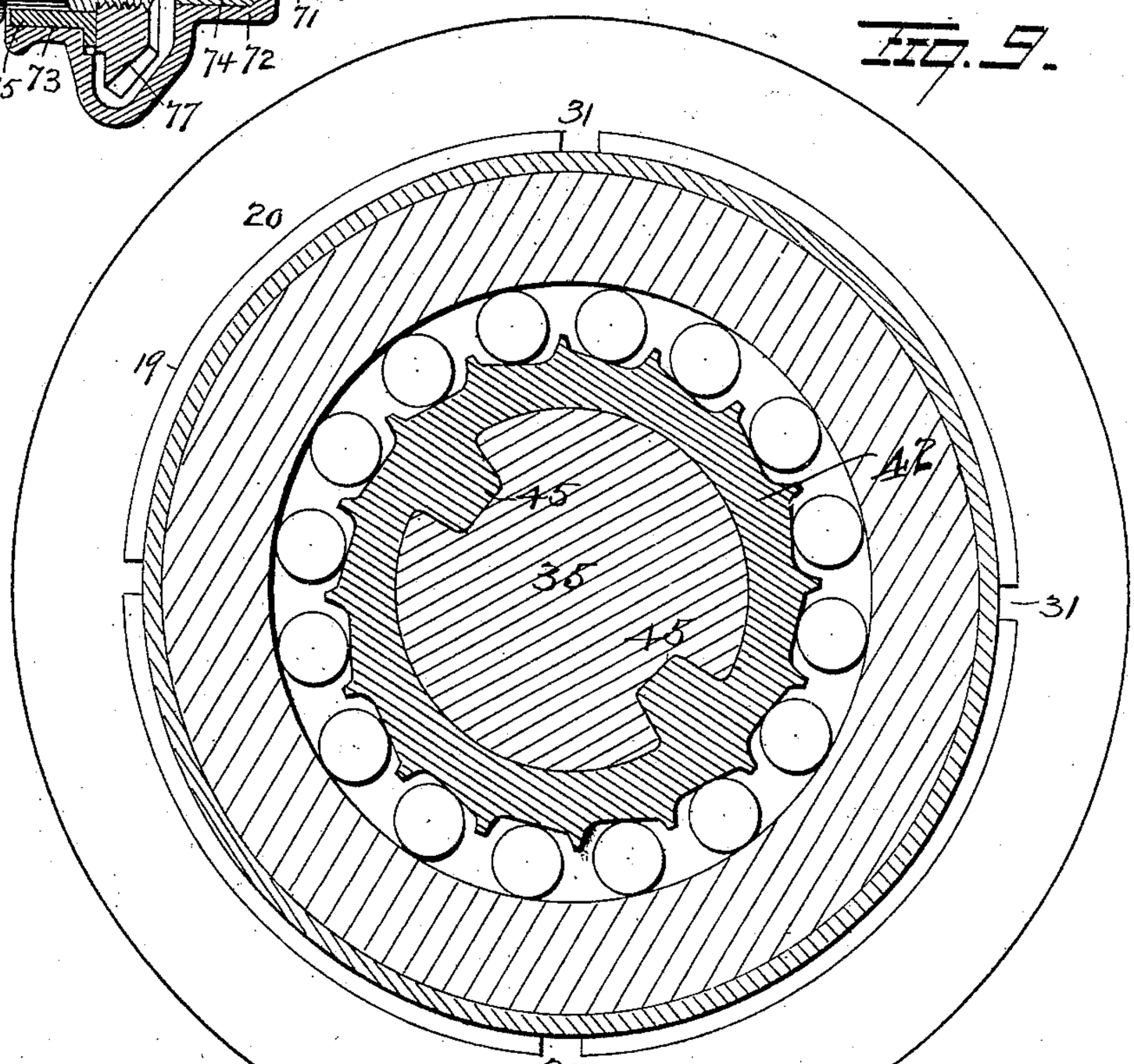

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Fig. 10.

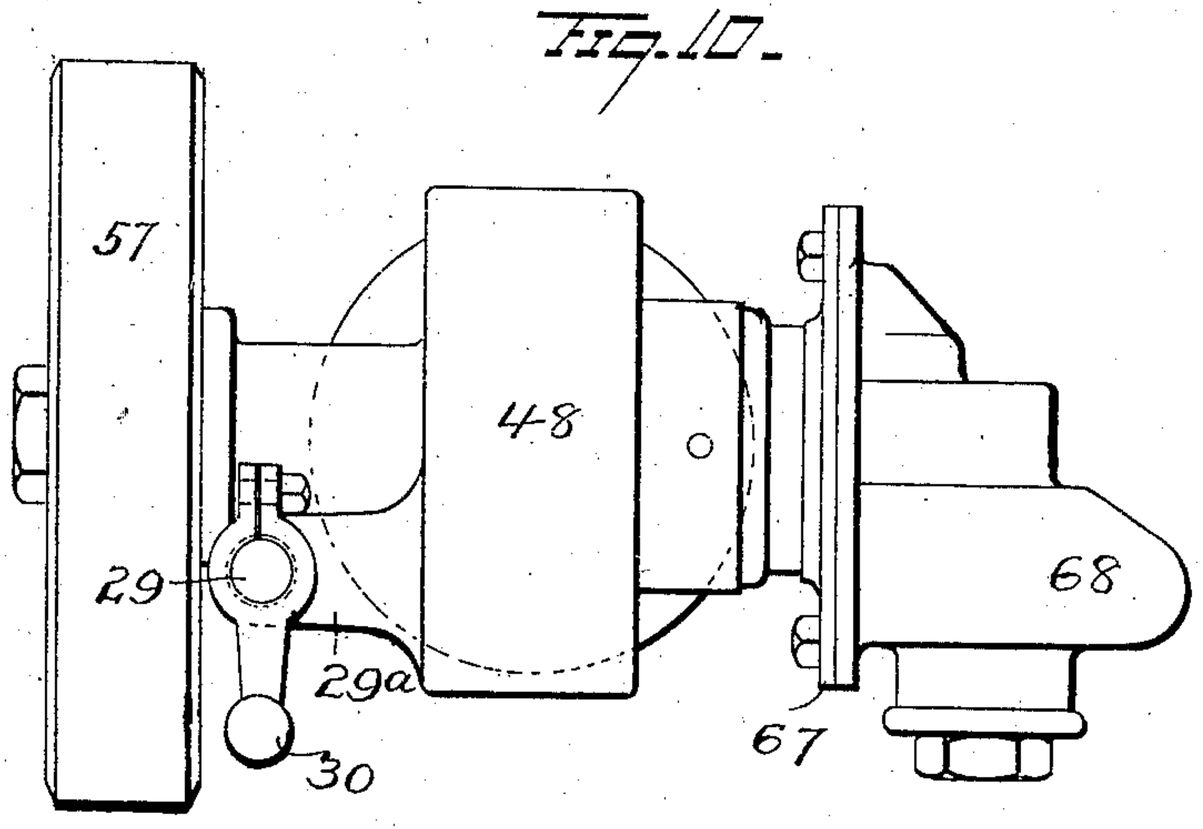
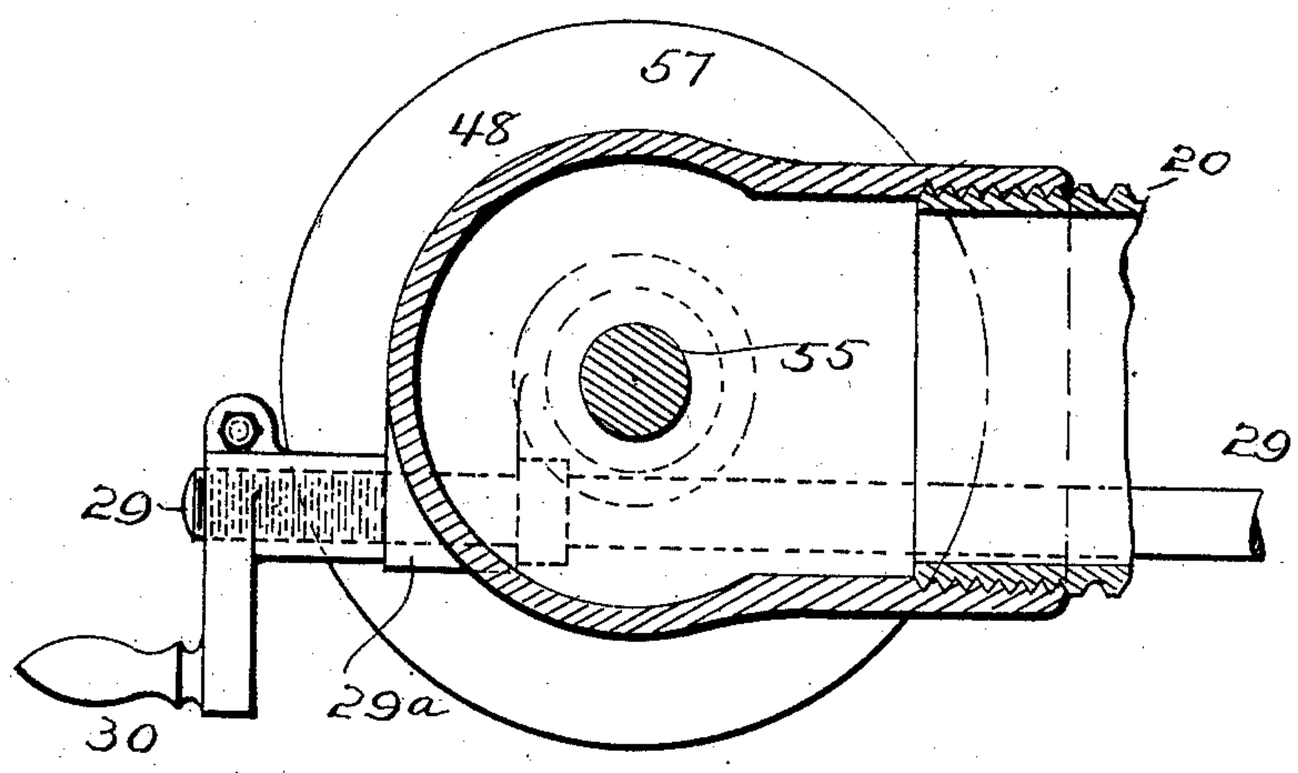


Fig. 11.



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UNITED STATES PATENT OFFICE.

THOMAS EDGAR ADAMS, OF CLEVELAND, OHIO, ASSIGNOR TO THE ADAMS DRILL COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

ROCK-DRILL.

No. 840,816. Specification of Letters Patent. Patented Jan. 8, 1907.

Application filed October 24, 1901. Serial No. 79,832.

To all whom it may concern:

Be it known that I, THOMAS EDGAR ADAMS, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Rock-Drills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in rock-drills, one object of the invention being to construct a rock-drill in such manner as to reduce the weight to a minimum and yet maintain a maximum amount of strength.

A further object is to so construct a rock-drill that it can be easily operated and manipulated and so that it can be readily transported.

A further object is to construct a rock-drill in such manner that the mechanism shall be compact, that friction shall be reduced to a minimum, and that can be readily and quickly adjusted.

A further object is to provide a simple and efficient feed mechanism.

A further object is to so construct the mechanism of a rock-drill that the parts thereof can be quickly and accurately assembled.

A further object is to construct the apparatus in such manner that lost motion shall be reduced to a minimum.

A further object is to insure the proper and accurate guiding of the drill-point, to prevent noise, and to give great solidity to the whole action of the machine.

A further object is to reduce to a minimum the number of parts of a rock-drill of the class to which my invention relates.

A further object is to increase the surface upon which the recoil will come, and thus give to the apparatus a maximum amount of durability.

With these objects in view the invention consists in certain novel features of construction and combinations and arrangement of parts, as hereinafter set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation of a rock-drill embodying my improvements. Fig. 2 is a longitudinal sectional view. Fig. 3 is a sectional view on the line *x x* of Fig. 1. Fig. 4 is a transverse sectional view on the line *y y* of Fig. 2. Figs. 5, 6, and 7 are views illustrating details. Fig. 8 is a sectional view illustrating the driving mechanism. Fig. 9 is a sectional view illustrating the ratchet device. Fig. 10 is a rear view. Fig. 11 is a sectional view of a portion of the apparatus, showing the mounting of the feed-operating rod 29.

1 represents a column or standard, preferably tubular in form, provided at its upper end with an adjustable head 2 of usual construction. A clamp 3 is adjustably secured, by means of bolts 4, to the standard 1, and immediately under said clamp a collar 5 is secured to the standard for preventing any possibility of the clamp slipping and to sustain clamp 3 when it is loosened for readjustment. The clamp 3 is provided with a laterally-projecting arm 6, (which may be made integral therewith,) and this arm supports the drill mechanism, for which purpose a housing 7 is located over the arm 6 and provided with a depending clamp 8, secured to said arm by means of a bolt 9. The upper portion of the clamp 8 is made with an internal groove 10 for the reception of a spline 11, secured to the arm 6 by means of a clamp 12, for the purpose of preventing displacement of the clamp and of the housing 7, from which the clamp depends, but more particularly to permit the machine to be moved to change long drills and again replaced exactly in its original position. The housing 7 carries the drill-operating mechanism, (as will be presently explained,) and by securing it to the arm 6 as above described it can be readily adjusted at any desired inclination, as the spline 11 is not made rigid with the arm, but is secured thereto by the clamp 12 in such manner that it can be readily adjusted to any point throughout the circumference of said arm.

The housing 7 is made in two parts hinged together at 13, and at the free edges of the parts of the housing bifurcated lugs 14 15 are provided. In one of these lugs a screw 16 is pivoted and adapted to enter the other bifurcated lug, a nut 17 being placed on the upper end of the screw and engaging the top of the lug 15 for holding the housing tightly closed. A tubular feeding-nut 18 is mounted to rotate within the housing and is provided internally with screw-threads to mesh with similar threads 19 on the exterior of a barrel 20, which passes through said nut and projects a considerable distance beyond both

ends of the housing 7. The feeding-nut 18 is preferably split, as at 21, and is provided on its exterior with any desired number of annular or peripheral flanges 22, which move in annular grooves 23 within the housing 7 for the purpose of preventing longitudinal movement of the nut when it is rotated. The feeding-nut 18 is also provided centrally between its ends with peripheral gear-teeth 24, which mesh with and receive motion from a pinion 25, mounted in the housing 7. The pinion 25 is carried on a tubular hub 26, journaled in the housing, and is provided interiorly with a feather 27, which enters a groove 28 in a removable rod 29, which passes through said hub. The rod 29 is mounted near its rear end in a bearing 29^a, Figs. 10 and 11, on the casing and projects beyond the rear end of the machine, where it is provided with a crank 30 for operating it. This rod may be made throughout its length with the groove 28 for the reception of the feather 27, or, if desired, it may be made angular and the bore of the hub made of a similar shape to accommodate it. The barrel 20 carries the drill-operating devices, as will be hereinafter explained, and the purpose of the mechanism just described is to provide means for moving said barrel forwardly to feed the drill. It is apparent that when the rod 29 is turned motion will be transmitted through the pinion 25 to the teeth 24 on the feeding-nut 18 and that the threaded interior of the latter meshing with the threaded exterior of the barrel will transmit motion to the latter; but to cause such transmission of motion to effect the longitudinal feeding movement of the barrel, provision must be made to prevent the turning of the latter. For this reason the barrel is provided with longitudinal grooves 31, into which flanges or feathers 32, secured within the housing 7, project. I prefer to employ several such grooves and flanges or feathers, so as to permit the barrel to be mounted in different positions.

By the provision of the split feeding-nut mounted within a two-part housing held together by clamping means I am enabled to readily adjust the nut for wear. Furthermore, by this construction, each time the barrel is put in place the fit of the parts will be accurately made, eliminating lost motion during wear, guiding the drill-point (which is carried by said barrel) with accuracy, preventing noise, and giving great solidity to the whole action of the machine.

A sleeve 33 is screwed into the forward end of the barrel and provided throughout a portion of its length with a bushing 34 for the accommodation of a drill-rod 35. The inner end of the sleeve 33 is enlarged somewhat and provided with a peripheral flange 36, which may bear against the inner wall of the barrel. A split or two-part disk 37 is located at the inner end of the sleeve 33 and provided with a flange 38, interlocking with the inner end of said sleeve. The enlarged portion of the sleeve 33 is made interiorly with an annular recess 39, within which two series 40 41 of clutch-rollers are located.

Within the two annular series of clutch-rollers toothed rings 42 43 are located, the rollers being located between the teeth of said rings and the periphery of the rings being inclined between each two teeth. The two series of clutch-rollers and the two toothed rings are separated by a ring 44. The wall of the recess 39, the clutch-rollers, and the toothed rings constitute two clutches and are so disposed that one will be a right-hand clutch and the other a left-hand clutch. The rings 42 43 of the clutches are provided with internal feathers 45, the feathers of the ring 42 entering spiral grooves 46 in the drill-rod and the feathers 45 of the ring 43 moving in straight grooves 47 in the drill-rod, or vice versa, according to desired direction of rotation of the drill. From this construction it will be seen that when the drill-rod is moved forwardly the feathers 45 of clutch-ring 42 moving in the spiral grooves 46 will cause said ring to turn in a backward direction, so that the clutch-rollers 40 will not bind between said ring and the wall of the recess 39. The clutch-ring 42 will therefore rotate freely and the drill-rod will be prevented from turning by the feathers on the ring 43 moving through the straight grooves 47 said clutch being prevented from rotation by the wedging action of the rollers 41 between said ring and the wall of the recess 39. When the drill-rod is withdrawn, the reverse action takes place. The rearward movement of the drill-rod will tend to rotate the clutch-ring 42 in the reverse direction by the engagement of its feathers with the spiral groove 46; but the ring 42 will be prevented from rotating by the wedging of the rollers 40 between said ring and the wall of the recess 39, and consequently the drill-rod will be made to turn when it is being withdrawn, the clutch-ring 43 in this case rotating freely.

A casing 48 is secured to the rear end of the barrel 20 by means of bolts 49, and these bolts also secure a head 50 in the rear end of the barrel, said head being provided centrally with a sleeve 51 for supporting the rear end of the drill-reciprocating drill-rod, and within the sleeve 51 a bushing 52 is provided for the accommodation of said drill-rod.

The casing 48 is provided with a lateral boss or sleeve 53, in which a bushing 54 is located to serve as one bearing for a transverse shaft 55, having a crank or eccentric 56, located centrally within the casing, and one end of this shaft is provided with a fly-wheel 57. The opposite side of the casing 48 is provided with an opening large enough to

permit the insertion of the shaft 55 and its crank or eccentric 56, and said opening is surrounded by an annular flange 58, within which a cast-iron sleeve 59 is secured by means of a set-screw 60 or other fastening means, and said sleeve is provided with an annular flange 61, abutting against the outer end of the flange 58. A bronze bushing 62 is disposed within the sleeve 59 and serves as the other bearing for the crank-shaft 55. Between the bronze bushing 62 and the sleeve 59 a sleeve 63 is mounted to turn, the lower end of said sleeve having a shoulder 64 to abut against the lower end of the sleeve 59 and also having an undercut shoulder 65 to receive an annular flange 66 at the outer end of the bronze bushing 62. The outer end of the sleeve 63 is provided with an integral annular flange 67, which constitutes a cover for a gear-casing 68, the latter being rigidly secured to said flange by means of bolts 69. From this construction it will be seen that the gear-casing 68 is pivotally or revolubly connected with the casing 48 and that the sleeve 59 affords a long bearing for such connection. The end of the shaft 55 which projects into the gear-casing is somewhat contracted and threaded for the reception of a bevel-pinion 70, which latter is also secured to the shaft and prevented from turning thereon by means of a key 71. The gear-casing is provided with bearings 72 73 (provided with bushings 74 75) for the reception of a shaft 76, having a bevel-pinion 77 secured thereon and meshing with the pinion 70 to transmit motion thereto and to the crank-shaft 55. The shaft 76 is made with a socket for the reception of a flexible shaft 77 driven from an electric or other motor. (Not shown.)

A yoke or pitman 78 is mounted at one end upon the crank-arm or eccentric 56 of the shaft 55, and the arms of said yoke or pitman pass through slots 79 in the head 50 and terminate near the center of the drill-rod within the barrel 20 in a cross-head 80, having an opening to receive the drill-rod. In rear of its grooved portion the drill-rod is contracted somewhat to form a shoulder 81 and is covered at 82 by a loose removable tube intended to take wear of the drill-rod, and with the tube-covered portion of the drill-rod the cross-head 80 on the yoke or pitman engages, the contacting edges of said cross-head with the drill-rod tube being slightly curved, as shown in Fig. 2, to permit said cross-head to rock slightly as the yoke or pitman 78 is operated by the eccentric 56. A metal disk 83 is placed on the contracted portion of the drill-rod and bears against the shoulder 81. A spring 84 encircles the drill-rod and bears at one end against a metal plate 85, between which and the disk 83 a leather washer 86 is placed. The other end of the spring 84 bears against a metal disk 87, between which and the arms 80 of the yoke or pitman a leather washer 88 is inserted. Another spring 89 encircles the drill-rod in rear of the arms 80 and bears at one end against a metal plate 90, between which and the arm 80 a leather washer 91 is placed. The other end of the spring 89 bears against a metal plate 92, between which and a disk 93 a leather washer 94 is placed. The disk 93 is provided on its rear face with an annular flange 95, having an interior beveled wall 96, against which a series of beveled blocks 97 is placed and preferably connected by a wire 98 through them. Each block 97 is provided with a shoulder 99 to engage a hollow or depression 100 in the drill-rod.

For the purpose of raising or lowering the barrel and the parts carried thereby I provide chains 101, provided at their upper ends with hooks 102 to engage the upper end of the standard 1. The lower ends of the chain will be placed around the housings or drill-body and hooks 103 at the lower extremities of said chains made to engage links of the chains above said housings. After loosening the clamps which secured the said housings in place the barrel 20 may be raised one end at a time and the hooks 102 moved from link to link of the chain. The chains might, if desired, be attached to suitable devices on top of the housing 7 instead of winding the chains around the housings.

Various other slight changes might be made in the details of construction of my invention without departing from the spirit thereof or limiting its scope, and hence I do not wish to limit myself to the precise details herein set forth.

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

1. In a drill, the combination with a sectional housing, an externally-threaded barrel passing through the same and a drill-rod carried by and longitudinally movable through said barrel, of a split feeding-nut mounted within the housing and engaging the threaded barrel and means for turning said nut.

2. In a drill, the combination with a housing made in two parts hinged together, and a clamp engaging the free edges of said sections, of an externally-screw-threaded barrel passing through the housing, a longitudinally-split feeding-nut disposed within the housing and engaging the threaded barrel and means for operating said nut, a drill-rod longitudinally movable through said housing, and means carried by the rear end of the barrel for operating the drill-rod.

3. In a drill, the combination with a housing, and a drill-body threaded externally from end to end and passing through the housing, a drill-rod independent of the barrel and carried in it, said housing having in-

terior annular grooves, of a feeding-nut mounted within the housing and engaging the threaded barrel, flanges on said nut and entering the grooves in the housing said drill-body having external longitudinal grooves, flanges projecting from the housing and entering said longitudinal grooves, means for operating said nut, a casing secured to the rear end of the barrel and means in said casing for reciprocating the drill-rod.

4. In a drill, the combination with a housing and an externally-threaded barrel movable longitudinally therethrough, of a feeding-nut mounted within the housing and engaging the barrel to move it longitudinally, gear-teeth on said nut, a pinion mounted in the housing and engaging said gear-teeth and means for operating said pinion.

5. In a drill, the combination with a housing and an externally-threaded barrel passing through said housing, of a feeding-nut mounted within the housing and engaging said barrel to move it longitudinally, gear-teeth on said nut, a sleeve mounted in the housing, gear-teeth on said sleeve and meshing with the gear-teeth on the feeding-nut and an operating-rod removably attached to said sleeve for turning it.

6. In a drill, the combination with a drill-rod having recesses and means for guiding it, of a disk mounted on said rod, an internally-beveled annular flange on said disk, blocks or wedges within said flange and engaging the drill-rod in the recesses therein, another disk on the drill-rod, two springs encircling the drill-rod between said disks, a crank-shaft, a pitman connected with the crank-shaft and a cross-head on said pitman, disposed between said springs.

7. In a drill, the combination with a barrel and a drill-rod mounted therein, of a casing secured to the barrel, a transverse crank-shaft in the casing and connected with the drill-rod, a lateral bearing on the casing for one end of the crank-shaft, the casing having a large opening in the side opposite said lateral bearing, an annular flange around said opening, a gear-casing, a sleeve projecting from said gear-casing and mounted to rotate within said annular flange and supported by said first-mentioned casing, a bushing within said sleeve for the reception of the crank-shaft, a pinion secured to the crank-shaft within the gear-casing, a second pinion in the gear-casing meshing with the pinion on the crank-shaft, said second pinion supported independently of the crank-shaft, and means for connecting a motor with said second pinion.

8. In a drill, the combination with a housing, of an externally-threaded cylindrical body portion passing therethrough, means engaging the external threads of said body portion for feeding the latter, a drill-rod longitudinally movable through the cylindrical body portion, a separate casing secured to the rear end of the body portion, operating mechanism for the drill-rod mounted in said casing and connected with said drill-rod and an external driving-shaft connected with said driving mechanism.

9. In a drill, the combination with a barrel and a drill-rod therein, of a crank-shaft, a head in one end of the barrel having slots, a sleeve on said head in which the drill-rod is guided and a pitman connected with the crank-shaft, passing through the slots in said head and connected with the drill-rod.

10. In a drill, the combination with a drill-body, a drill-rod therein, a housing at the rear end of the drill-body, journal-bearings in said housing, bushings in said bearings, a crank-shaft mounted within said bushings and a connection between said crank-shaft and drill-rod, of a gear-casing having a part mounted in said housing around the bushing therein, whereby the gear-casing will be supported by the housing independently of the crank-shaft, and gearing in said gear-casing for rotating the crank-shaft.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS EDGAR ADAMS.

Witnesses:

JOHN D. ERTEL,

C. J. CRABLE.