(No Model.)

C. MORRILL.

DRILL CHUCK.

No. 274,135. Patented Mar. 20, 1883.

FIG. 1.

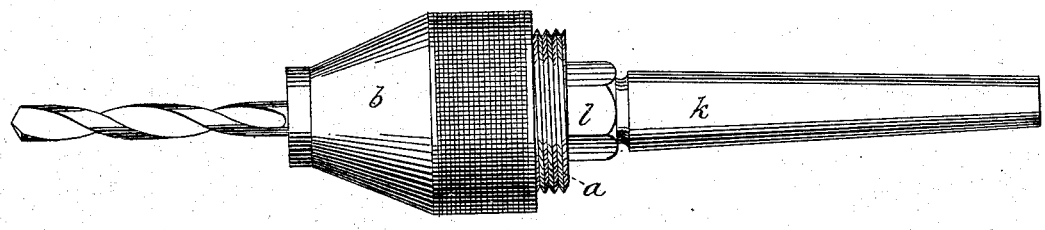

FIG. 2.

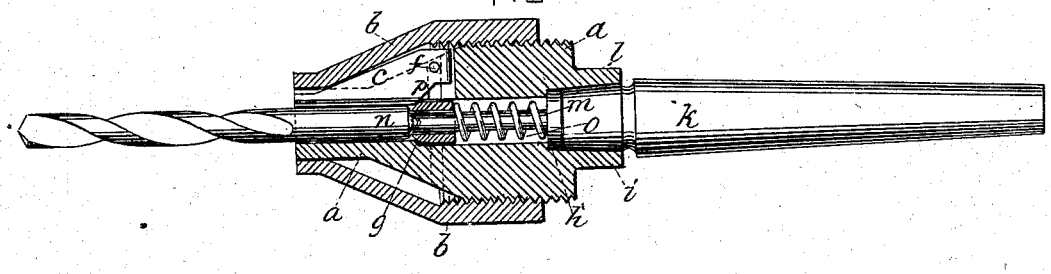

FIG. 3.

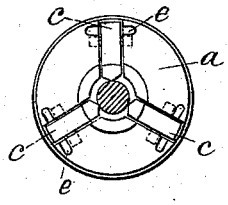

FIG. 4.

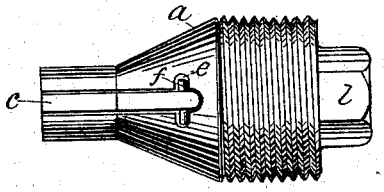

FIG. 5.

WITNESSES:

Jno. E. Gavin

Chas. M. Higgins.

INVENTOR:

Charles Morrill

by S. Walworth

Atty.

UNITED STATES PATENT OFFICE.

CHARLES MORRILL, OF NEW YORK, N. Y.

DRILL-CHUCK.

SPECIFICATION forming part of Letters Patent No. 274,135, dated March 20, 1883.

Application filed July 6, 1880. Renewed August 25, 1882. (No model.)

To all whom it may concern:

Be it known that I, CHARLES MORRILL, of New York city, in the State of New York, have invented certain new and useful Improvements in Drill-Chucks, of which the following is a specification.

My invention relates to that class of drill-chucks in which a conical sleeve or case screws upon a slotted carrying-head carrying the gripping-jaws in the slots thereof, which jaws have a wedging-face on their exterior to match with the cone of the sleeve, by which they are forced inward with a wedging action to grip the drill, or are allowed to expand to release the drill when the sleeve is unscrewed. In most chucks of this kind heretofore the jaws have more or less of a pivotal or jointed connection at their base with springs or other pivotal or guiding parts. Now, my invention aims to dispense with such parts, to render the construction simple and the movement of the jaws more direct, and to insure a more extended, evenly-disposed, and powerful grip of the jaws on the drill, and also to effect the expansion of the jaws in a simpler and more efficient manner. In my invention, therefore, the jaws slide at their bases directly upon the bases of the slots in the carrying-head, with a simple sliding wedge movement radially in or out, the bases of the jaws and the connecting-bases of the slots being rounded or semicircular, instead of flat, as heretofore, whereby the construction of the slot is not only rendered cheaper, but a more extended bearing between the base of the jaw and the base of the slot is obtained, so as to reduce wear and render the movement of the jaws more smooth, which forms one feature of my invention; and another feature of my invention consists in a spring-impelled plug or sleeve centrally arranged and pressing upon the jaws at their convergence with a wedging action to expand the same in a simple and efficient manner. My invention also embodies minor features, as hereinafter fully set forth.

Figure 1 of the annexed drawings gives a side elevation of my improved drill-chuck, and Fig. 2 a longitudinal section thereof. Fig. 3 is a plan view of the slotted carrying-head, and Fig. 4 a side elevation thereof; Fig. 5, a side view of one of the gripping-jaws removed.

In the drawings, *a* indicates the carrying-head, which is cylindrical at its base end and threaded with a screw-thread of suitable pitch, while its outer extremity is also cylindrical for a short length, but of reduced diameter, and its middle portion is tapered or conical. The outer portion of the head is slit with preferably three radial slots, which extend from the cylindrical or threaded base portion to the outer extremity and open into the bore, which extends centrally through the head from end to end.

b indicates the conical sleeve or case, which is of a form to correspond with and encircle the head, and is threaded at its base to screw upon the head.

c c indicate the gripping-jaws, which slide in the slots of the carrying-head, and have an outer inclined face to match with the conical part of the sleeve, by which they are forced inward by a wedging action to grip the drill when the sleeve is screwed backward, and are allowed to expand to release the drill when the sleeve is screwed forward, as usual in chucks of this kind. The gripping-edges of the jaws are of the usual V or angular shape to better seize the drill, and to meet closely together when forced to their full extent inward. It may now be observed that the base of each gripping-jaw lies at right angles to its gripping-edge, and that these bases rest directly upon the bases of the slots in the carrying-head. The gripping-jaws hence act as simple wedges bearing upon the base of the guiding-slots and sliding thereon, according as the sleeve is screwed back or forth, with a direct radial in or out motion. This construction, although not peculiar to my invention, has the advantage of simplicity and efficiency, as the parts are reduced to the fewest number possible, and the motion of the jaws is rendered more accurate and easy, owing to their directness of action, and that wear and friction come in two parts or surfaces only—viz., the inclines and the bases of the jaws. I improve this construction, however, by forming the base of the slots rounded or semicircular, and the base of the jaws correspondingly rounded to match therewith, as seen best in Fig. 4. This construction has the advantage that the slots may be formed in the carrying-head by simply drilling a hole at the base end and milling out the slot from the tip end toward the said hole,

thus forming the slot perfectly and cheaply. Furthermore, the rounded coinciding base of slot and jaw provides a more extended bearing between them, which insures a smoother motion of the jaw and reduces wear. To prevent the jaws being displaced lengthwise from the slots, grooves *e e* are formed in the side walls of the slots, and the jaws are provided with projecting pins *f f*, which engage therewith, and, being free to travel therein, prevent any lengthwise displacement of the jaws, while offering no resistance to their radial motions. These grooves *e e*, as may be observed from the drawings, are semicircular, and are also formed by drill-holes at the margin-line of the slot before the slot is milled out, which, with the simple pin driven into the jaw to engage therewith, conduces to economy of construction, while being quite efficient in action. Now, the central bore of the carrying-head, at its outer end, is of a size to freely admit the largest-sized drill for which the chuck is adapted; but this bore terminates near the bases of the sliding jaws, from which point the bore is slightly enlarged—say about a sixteenth—so as to form a slight shoulder, *g*, where the two bores meet. At the back end of the head the bore is still further enlarged, forming a wide shoulder, *h*, and a large and slightly-tapering socket, *i*, in which the shank of the tapering spindle *k* is tightly fitted, while the long tapering part of the spindle is driven into the socket in the spindle of the lathe by which the chuck is rotated, as will be readily understood by those familiar with these tools. The back end of the carrying-head containing the socket *i* is contracted into a hexagonal neck, *l*, to better enable the chuck to be attached or removed to or from the spindle *k* or to or from the lathe. Now, a fixed pin, *m*, is arranged midwise in the bore of the carrying-head, and terminates at or near the base of the gripping-jaws, so as to support the end of the drill and limit the depth of its insertion in the chuck, as well as to resist the pressure of boring. The tip of this pin is preferably countersunk, so as to better receive the end of the drill, which is usually slightly conical, while the opposite or back end of the pin is formed with an enlarged flat head, which is socketed in the forward end of the socket *i* and rests tightly against the shoulder *h*, while the shank of the spindle *k* abuts closely against the same, thus rigidly holding the pin in position. A movable plug or sleeve, *n*, guided in the bore of the carrying-head, or on the pin *m*, is constantly pressed forward by a spring, *o*, against inclines *p p* on the inner edge of the gripping-jaws, near the base thereof, and thus by a wedging action serves to diverge or expand the several jaws when the sleeve is unscrewed, and it will be observed that the outward travel of the sleeve is limited by the shoulder *g*, against which it strikes.

It may be observed that the outer end of each jaw is straight to correspond with the cylindrical nose of the carrying-head, and of the conical sleeve; that the gripping edge of each jaw is at right angles to its base, and that each has one inclined face on the inner edge, near the base, to contact with the expanding-plug *n*, and one inclined face on the outer side to match with the cone of the sleeve.

It may also be seen that as the supporting-pin *m* is held in position in the bore of the chuck by being a tight-driven fit therein, and also by the abutment of the shank of the spindle against the head of the pin, hence when the spindle *k* is removed the pin may be forced out, thus leaving the bore of the carrying-head open, so that if a hollow spindle is now inserted in the socket *i* of the head the chuck will thus be converted into a hollow chuck to admit continuous lengths of wire or similar material, thus constituting an important advantage of this feature of my device; and it may be seen that when thus changed into a hollow chuck the function of the spring *o* will not be affected, as its back end will abut against the inserted shank of the hollow spindle, and hence perform its usual action, notwithstanding the removal of the pin.

By the described construction of my improved chuck, in addition to the advantages before referred to, the expanding and contracting movements of the jaws are produced in a very accurate and easy manner, and the grip of the jaws on the drill is found to be very evenly disposed, extended, and powerful, so much so that by simply grasping the milled part of the sleeve (see Fig. 1) and turning it by the easy action of the hand a sufficient grip is obtained upon a three-eighths drill to cause it to penetrate to its full depth into tough steel without any indication of slippage.

I am aware that drill-chuck jaws have been slotted and secured in place by pins fixed in the chuck; and I am also aware that jaws have been provided with recesses or grooves to slide on projecting ribs of the chuck, and therefore I do not claim either of these constructions. In the first form mentioned the slot in the jaw weakens it and necessitates placing a pin in the chuck, which has to be cut away at intervals for that purpose, and in the second form the recesses or grooves cut in both sides of the jaw weaken it and necessitate forming ribs on the chuck. Both of these forms are comparatively costly to fit, and also have weak points when finished. In my device I merely drill a small hole in the jaw and drive into and partly through said hole a pin whose ends fit and slide in grooves cut in the sides of the radial slot in the chuck. By this construction the jaw is not materially weakened, and the side grooves can be cut in the radial slot with very little labor after the latter has been finished.

What I claim as my invention is—

1. In combination with the head *a*, having radial slots and radial grooves in the sides thereof, the sliding jaws C, provided with cross-pins whose projecting ends slide in the radial side grooves, substantially as and for the purpose specified.

2. In a drill-chuck of substantially the described kind, a spring-impelled sleeve or plug centrally arranged in the carrying-head and pressing upon and between the jaws thereof at their points of convergence, the meeting edges of the said plug or jaws, or both, being inclined, whereby the plug acts as a central expanding-wedge to diverge or expand the several jaws simultaneously, substantially as herein set forth.

3. In a drill-chuck of substantially the described kind, a fixed pin centrally arranged in the carrying-head and terminating at or near the bases of the gripping-jaws to support the end of the drill, in combination with a spring-impelled sleeve or plug moving on or about the same to expand the said jaws, substantially as herein shown and described.

4. In combination with the head *a*, having radial slots with rounded or semicircular bottoms and radial grooves in the sides thereof, the sliding jaws *c*, having their bases rounded to fit the bottoms of the radial slots, and provided with cross-pins for sliding in the radial grooves, both the bottoms of the radial slots and the radial grooves forming bearing-surfaces for the jaws and cross-pins, and said pins and grooves also serving to prevent the outfall of the jaws, substantially as described.

5. In a drill-chuck of substantially the described kind, a slotted carrying-head provided with sliding wedge-jaws moving in said slot, and formed with a bore extending centrally through the said head, which bore is slightly enlarged backward from a point at or near the base of the jaws, in combination with a spring-impelled wedging sleeve or plug moving in said enlarged bore and between the ends of the jaws to expand or diverge the jaws by a radially spreading or wedging action, and limited in its outward or expanding movement by the shoulder formed where the enlarged bore meets the smaller bore, substantially as herein shown and described.

6. In a chuck of substantially the described kind, the combination, with the slotted chuck-head, formed with a central bore extending through the same, of the removable central pin, *m*, terminating at or near the base of the gripping-jaws to support the end of the drill, and formed with a head at the opposite end to seat against a shoulder in the back end of the chuck-head, in combination with the removable spindle *k*, socketed in the end of the chuck-head, against the head of the said pin, and serving to hold the same in fixed position therein, but allow its removal when required, substantially as herein shown and described.

CHARLES MORRILL.

Witnesses:
CHAS. M. HIGGINS,
EDWARD H. WALES.