J. B. PURSSELL.

CHUCK.

APPLICATION FILED AUG. 13, 1915.

1,193,716. Patented Aug. 8, 1916.

Fig. 3,

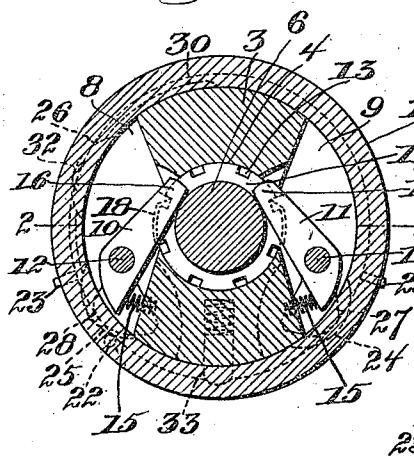


Fig. 1,

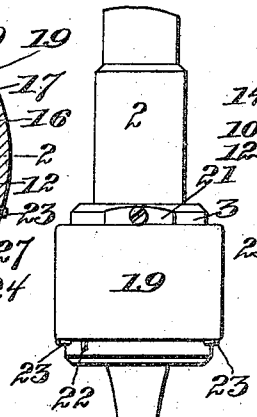


Fig. 5,

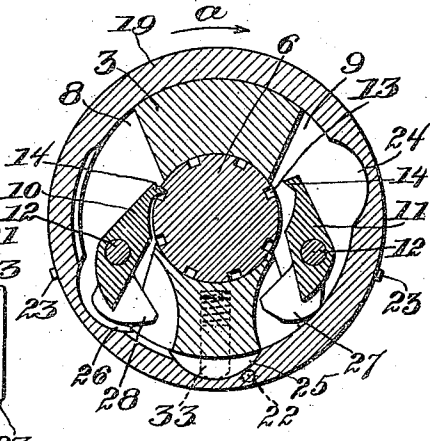


Fig. 2,

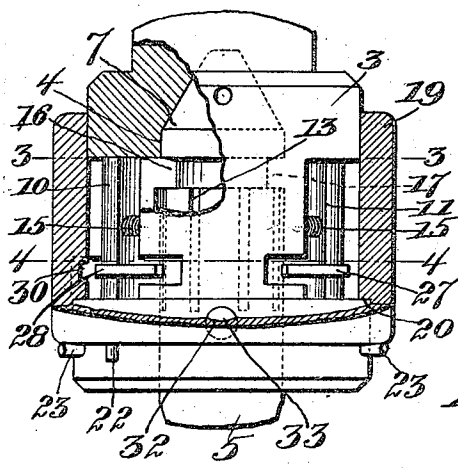


Fig. 6,

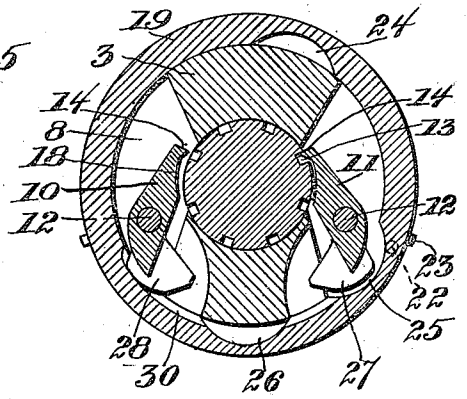


Fig. 8,

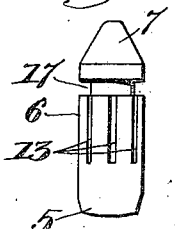


Fig. 4,

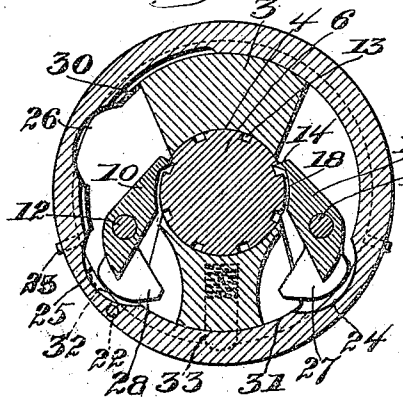


Fig. 9,

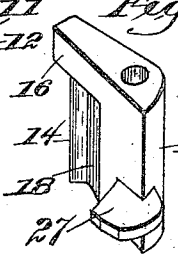
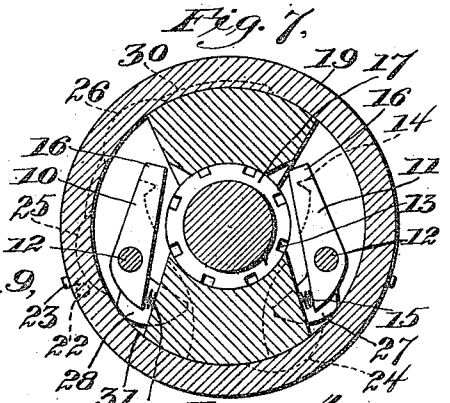


Fig. 7,



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Phillips, Van Santvoord & Rich

UNITED STATES PATENT OFFICE.

JAMES B. PURSSELL, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO CLARENCE V. PURSSELL, WYNNEVIE M. PURSSELL, AND ROGER WYNNE PURSSELL, OF BOSTON, MASSACHUSETTS.

CHUCK.

1,193,716. Specification of Letters Patent. Patented Aug. 8, 1916.

Application filed August 13, 1915. Serial No. 45,338.

To all whom it may concern:

Be it known that I, JAMES B. PURSSELL, a citizen of the United States, residing at Dorchester, Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Chucks; 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.

This invention relates to ratchet structures and more particularly to a ratchet chuck and tool.

It is one of the objects of this invention to provide a chuck and bit combination which is simple in construction, substantial in design and has but a few operative parts.

A further object of the invention is to provide a chuck which eliminates the objectionable tightening devices commonly required to close in upon and clutch interchangeable, detachable tools.

Another object of the invention is to provide a chuck adapted to readily receive and release interchangeable tools and to lock a tool against withdrawal save at a predetermined position.

Another object of the invention is to provide a chuck or coupler in which the tool or attached part may be rotated in either direction or positively locked against relative movement and which has the further function of controlling the removal of the tool.

To the accomplishment of the objects referred to and such others as may hereinafter appear, as will readily be understood by those skilled in the art, the invention comprises the features and combination of parts hereinafter described and particularly pointed out in the appended claims, and an embodiment of the preferred form of which is herewith illustrated.

Figure 1 is an elevation of the device showing the brace and bit broken away; Fig. 2 is a sectional elevation on the line 2—2 of Fig. 3, showing the ratcheting mechanism with a bit inserted; Fig. 3 is a section on line 3—3 of Fig. 2, showing the tumblers locking the bit against withdrawal and rotation in either direction in the chuck; Fig. 4 is a section on line 4—4 of Fig. 2 showing the tumbler clicks locking the bit against relative rotation; Fig. 5 is a section on line 4—4 of Fig. 2 showing the tumblers set to permit the driving of the bit in a right-hand direction; Fig. 6 is a section on line 4—4 of Fig. 2 showing the tumblers set to permit the driving of the bit in a left-hand direction; Fig. 7 is a section on line 3—3 of Fig. 2 showing the tumblers set to release the bit for withdrawal; Fig. 8 is a detail showing the upper or head end of the bit; and Fig. 9 is a perspective of one of the detached tumblers.

One of the disadvantages found in common forms of brace stocks and the like tools with chucks is the necessity of providing and adjusting gripping jaws for clasping the hilt of the tool in the chuck, with the additional adjustments and parts required for the ratcheting device.

It is the aim of this invention to provide an instrument in which interchangeable, detachable tools, bits or the like may readily be inserted and automatically locked against withdrawal without manual adjustment of receiving jaws and from which the tool can be removed with ease and rapidity and others interchanged. To that end, the instrument includes a set of automatic tumblers which automatically lock the tool in the instrument and have the further function of rotatively driving the tool with rotation of the instrument and arranged to ratchet when necessary.

While it is understood that the invention is adaptable for use in a variety of devices and combinations, it is illustrated in the present embodiment as arranged for use in a brace and bit instrument, a portion of the brace stock 2 being shown and having formed on its lower end an enlargement or body portion 3 which is axially chambered as at 4 to receive the outer or shank end of a tool 5 shown as an auger bit. The upper end of the bit is preferably formed cylindrical as at 6 and is adapted to snugly but rotatably fit in the socket 4 of the body 3. The upper end of the bit 5 is tapered as at 7 and engages a complemental seat portion at the top of the socket 4.

The body portion 3 of the brace stock is provided with lateral or side pockets 8 and 9, shown in the cross-sectional views, these

pockets opening into the tool receiving socket 4. In each of these pockets 8—9 there is mounted a respective tumbler 10—11 having pivots 12 arranged at one side of the diameter of the body part 3 and extending longitudinally and parallel to the axis of the body 3. The tumblers 10—11 are convergently disposed in the pockets 8—9 with their ends or inner longitudinal corners swinging inwardly toward the central socket 4 and are adapted to engage, on opposite sides of the cylindrical part 6 of the tool, with shoulders or teeth 13 formed longitudinally thereon. The tumblers 10—11 are each automatically swung inwardly, so that their inner abutment edges 14 will yieldably engage the teeth 13, by means of springs 15 reacting upon the contiguous surface of each tumbler and against the body portion 3 upon which they are seated. Obviously these springs 15 may be of any suitable form and conveniently disposed so as to properly function and swing the longitudinal edges or faces 14 of the tumblers 10—11 toward each other to stand tangential in opposite directions to the teeth 13 of the tool 5 when the latter is inserted in the socket 4.

It is one of the features of the present invention to so design, construct and arrange the tumblers 10—11 that either or both of them will operate to automatically latch or lock a tool 5 when its upper end is inserted in the socket 4 of the bit stock 3, and this is accomplished by providing or forming upon each of the tumblers 10—11 a shoulder or portion 16 which is adapted to project sufficiently into the chamber or socket 4 to automatically snap into interlocking engagement with the upper end of a tool 5 when it is inserted in the chuck. This interlocking of the tumbler 10—11 with the tool 5 is provided by forming an annular groove 17 just below the conical end of the tool 5 so that when the tool is inserted in the socket or chamber 4 the shoulder or portion 16 of a tumbler, or of the tumblers, will yield and automatically snap into the groove and lock the tool 5 against longitudinal movement and permit of its relative free rotation. For the purpose of designing the parts of the chuck so as to be compactly arranged within the body 3, a tumbler 11, is shown in Fig. 9 as being relieved or concaved at 18 on one side or face, thus forming a clearance behind the locking or dogging edge or click 14 of the tumbler when the latter enters the spaces between the teeth 13 at the shank of the tool 5.

Another advantage of this construction is that when a tumbler 10 is swung outwardly just sufficient for its abutting edge 14 to clear the cylinder 6, the shoulder or portion 16 of the tumbler will still project sufficiently into the annular slot 17 in the shank of the bit to prevent the longitudinal withdrawal or movement of the bit from the socket 4 though the other tumbler is retracted to clear the tool.

The tumblers 10—11 are mounted so that they are automatically swung toward each other with their abutment edges 14 adapted to encounter or engage the longitudinal teeth 13 and when both of the tumblers so engage the teeth 13 as shown in Figs. 3 and 4, the tool 5 is locked against relative rotation as to the tumblers and as to the brace stock 3.

It is a feature of the present invention to provide for the simultaneous, driving engagement by the tumblers 10—11 with the shank of the tool 5, or to effect a removal of either of the tumblers from the shank of the tool, and provide for the removal and disengagement of both of the tumblers so as to unlock the tool 5 and permit its withdrawal. To that end there is rotatably mounted upon the stock body 3 of the brace stock a sleeve 19 which rests on a lower shoulder 20 of the stock 3 and is held against longitudinal shifting movement thereon by an upper stop 21. The sleeve 19 has a shoulder 22 adapted to engage radial stops 23 after the sleeve has been moved through a predetermined arc. The sleeve is of such length as to substantially cover the body portion 3 of the brace stock and is provided with a plurality of short internal, longitudinal, recesses or channels 24, 25, 26, with arcuate surfaces and which extend to the lower edge of the sleeve 19 and permit the downward adjustment or assembling of the sleeve over outwardly projecting contiguous lever portions 27—28 of the tumblers 10—11. These portions are shown in Fig. 8 as located in a common plane and adjacent the lower ends of the tumblers and are in the form of cams whose peripheral surfaces are curved and adapted to slidably contact with the inner surface of the sleeve 19 when the latter is rotated on the body 3 within the limits of the annular stops 23. The tumblers 10—11 are shown in Figs. 2, 3 and 4 as springing into locking and abutting engagement with the inserted shank portion 6 of the tool 5 at which time the lever faces 27—28 of the tumblers project into the adjacent recesses 24—25 formed in the sleeve 19, the faces 27—28 being out of contact with the inner surfaces of the sleeve 19 at the recesses 24—25.

When it is desired to actuate either or both of the tumblers 10—11 the operator simply turns the sleeve 19, as, for instance, from the position indicated in Fig. 3 to that indicated in Fig. 5. As the sleeve 19 is turned to the position shown in Fig. 5 the lever end 27 is engaged by the sleeve surface and the cam swung inwardly with a resultant outward swinging motion of the inner end of the tumbler 11 to clear the abutment shoulder 14 thereof from engagement with,

and from the path of, the teeth 13 of the shank 6 of the tool. As previously stated, when the tumblers 10—11 and the sleeve 19 stand in the position indicated in Fig. 3, the portions 27—28 project into the relatively deep recesses 24—25, but as the sleeve 19 is rotated the thicker portion of the sleeve 19 rides against the lever surface 27—28 and the internal arcuate cam surface 31 engages and tilts the abutment member 11 about its pivot. When the tumbler 11 is disengaged from the teeth 13 of the tool 5 then a rotation of the brace stock to the right will cause the rotation of the tool 5 by reason of the abutment of the inwardly projecting end or abutment face 14 of the tumbler 10 positively engaging one of the teeth 13 of the tool. Then the rotation of the tool will be in the right hand direction as indicated by the arrow *a*.

When the sleeve 19 stands in position indicated in Fig. 5 so that the tumbler 11 is rocked outwardly by the lever 27 riding on the sleeve surface, the cam 28 of the opposite abutment member 10 stands in the recess 26 which is of such depth as to clear the lever end 28 and permit the abutment end of the tumbler 11 to stand in engaging position with the adjacent teeth 13 of the shank of the tool.

When it is desired to give the tool 5 a left-hand direction of rotation then the operator again turns the sleeve 19 so as to carry the stop pin or projection 22 against the right hand stop indicated in Fig. 6, at which time the lever 27 of the tumbler 11 will slide off the internal surface and outwardly into the deeper and adjacent recess 25. During this time the lever end 28 of the tumbler 10 will have been engaged by the adjacent portion of an internal groove 30 of the sleeve 19 so that the abutting edge of the tumbler 10 is drawn outwardly and disengaged from the teeth 13 of the shank 6 of the tool and thus clears the latter while the opposite tumbler 11 has been thrown into abutting position with the teeth under the impulse of its respective spring 15. The groove 30 is of less depth than and intersects the recesses 25—26 and is cut in the plane of the lever ends 27—28 of the tumblers.

To remove the tool 5 entirely from the chuck the tumblers 10 and 11 are so actuated that their locking shoulders or edges 16 are cleared entirely from the annular groove 17 in the shank of the tool 5, and this is accomplished by turning the sleeve 19 about the chuck body 3 until the stop 22 engages the left-hand shoulder or stop 23 (Fig. 7). At this position of the sleeve 19 the lever ends 27—28 have been tilted inwardly by riding upwardly out of the recess 24—25 on to the interior surface 31 forming the high point of the inner cam surface of the sleeve, with the result that the abutment faces 14 of the tumblers 10—11 and the locking shoulders 16 thereof are withdrawn entirely so as to clear the cylindrical portion 6 of the tool 5 and permit the withdrawal of the latter.

It will be noticed that the internal cam groove 30 traverses and is interrupted by the pockets 24, 25 and 26 so that at the several positions of the actuating sleeve 19 on the body portion 3, the tumbler members 10—11 may both be allowed to abut the teeth 13 of the inserted tool, as in Fig. 3, or one of the tumblers may be allowed to remain in abutment, as in Fig. 5, at which time the lever end 28 of the tumbler 10 stands in the adjacent recess 26 while the tumbler 11 is swung clear of the tool, and lever end 27 has been swung inwardly by rotation of the sleeve to lift it on the cam surface 31. The further turning of the sleeve 19 carries the clearance recess 26 away from the lever end 28 of the tumbler 10, and it is tilted by engagement with the continuation or adjacent portion of the annular cam groove 30, at which time the lever end 27 of the tumbler 11 may play in pocket 25 while ratcheting over the teeth 13. The rotation of the sleeve 19 to the position indicated in Fig. 7 carries the internal cam surface 30 to such position that the parts 27—28 of the tumblers are forced entirely out of the recesses and cam groove 30 and ride upon the inner surface 31 so that the tumblers are clear from the tool. The depth, length and contour of the effective cam surface 30 is such that, save when the sleeve 19 is turned to position (Fig. 7), either one or both of the tumblers is held in such position that the locking shoulder 16 is extending into the groove 17 of the tool and this, therefore, cannot be withdrawn from the clutch until the sleeve is set as shown in Fig. 7 to throw out both tumblers. The shoulders 16 are of such proportions as to project into the groove 17 while the tumblers are ratcheting over the teeth so as to prevent the tool being withdrawn.

For the purpose of temporarily locking the actuating sleeve 19 in its several positions so as to hold the tumblers 10—11 in the desired position, the interior surface of the sleeve 19 is provided with a series of small indentations 32 at suitable angular relations into which will snap a detent 33 which is yieldably supported in the lower portion of the body 3. Thus, as the sleeve 19 is turned to the positions indicated in Figs. 3, 5 and 6, the detent 33 will automatically engage and temporarily lock the sleeve against rotation.

It is understood that the invention is not limited in details of construction nor in the combination of parts herein set forth, and that they may be variously modified within the skill of the artisan without departing

from the scope of the invention and within the limitations of the claims hereof.

The terms "tool" and "bit" are to be interpreted as including any part adapted for adjustment in the chuck and to be operated as set forth.

I claim—

1. A ratchet structure, having, in combination, a driving chuck having a body with a tool receiving chamber and longitudinal pockets communicating with said chamber, means in said pockets for rotating the inserted tool in either direction or for holding it against rotation in the chuck, and for automatically locking the tool against withdrawal, and mechanism for changing and controlling said means.

2. A ratchet structure, having, in combination, a driving, chuck-body axially chambered to receive a rotatably fitting tool, and having side openings extending to said chambers, tumblers longitudinally pivoted in the openings of said body and automatically operative to tangentially abut an inserted, removable tool, and means mounted on said body for controlling the position of the tumblers to automatically lock the tool against withdrawal when inserted and for rotating the inserted tool in either direction and for unlocking the tool to permit its withdrawal.

3. A ratchet tool, having, in combination, a driving stock with a chuck body, a tool insertible and rotatively fitting the chuck, tumblers pivoted in said body with their axes parallel the axis of said tool and having locking engagement with the inserted tool to prevent its withdrawal and also operative to tangentially abut said tool to rotate it in either direction, and a manually adjustable device mounted on the chuck body and operative to actuate said tumblers and control their locking and driving positions as to the tool.

4. A ratchet tool, having, in combination, a driving stock with a chuck body having side openings, tumblers, one pivoted in each of said openings and operating automatically toward each other to engage a tool insertible in the chuck, from tangentially opposite directions, said tumblers having shoulders operative to lock the inserted tool against withdrawal, and a sleeve rotative on the chuck body and having a cam-face engageable with said tumblers for positioning them to jointly or severally abut, or to unlock the inserted tool.

5. A chuck comprising a body part chambered to receive a removable, interchangeable tool, ratchet tumblers mounted in said body for rotating the inserted tool in either direction or for holding it against rotation in the chuck, and for automatically locking the tool against withdrawal, and means for changing and controlling the position of the tumblers.

6. A ratchet clutch and tool, having, in combination, a chuck body having a tool receiving chamber, automatic tumblers mounted in said body, and a tool inserted in said body and having locking engagement with said tumblers, the tumblers also engageable with the tool for rotating the same.

7. A ratchet clutch and tool, having, in combination, a chuck body having a tool receiving chamber, automatic tumblers mounted in said body, and a tool inserted in said body and having locking engagement with said tumblers, the tumblers also engageable with the tool for rotating the same, and a device for conjointly or severally disengaging the tumblers from rotative engagement with the tool.

8. A chuck and tool having, in combination, a chuck body with a tool receiving chamber, a plurality of tumblers yieldably mounted and having sides projecting into said chamber, a tool removably insertible in the chamber and designed to interlock with said tumblers against longitudinal movement and be rotatively driven in either direction thereby, and means for disengaging said tumblers severally or conjointly from rotative engagement with the tool.

9. A chuck and tool, having, in combination, a chuck body, a tool removably insertible in said body and having an annular groove and a plurality of longitudinal shoulders formed adjacent one end, automatic tumblers in said body for interlocking in the groove of the inserted tool, and engageable with said shoulders to rotate the tool in either direction, and means for changing and controlling the positions of the tumblers.

10. A chuck and tool, having, in combination, a chuck body, a tool removably insertible in the chuck and having an annular groove in its shank end, and tumblers mounted in the chuck for rotatively driving the tool, said tumblers adapted to freely ratchet on the tool in one direction, and means on the tumblers for locking in the groove of the bit while the tumblers are ratcheting to prevent withdrawal of the bit.

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Winesses:
CLARENCE V. PURSSELL,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

It is hereby certified that in Letters Patent No. 1,193,716, granted August 8, 1916, upon the application of James B. Purssell, of Boston, Massachusetts, for an improvement in "Chucks," errors appear in the printed specification requiring correction as follows: Page 2, line 104, for the abbreviation and numeral "Fig. 8" read *Fig. 2;* page 3, line 64, for the word "point" read *points;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of October, A. D., 1916.

[SEAL.] R. F. WHITEHEAD,

Cl. 145—75. *Acting Commissioner of Patents.*