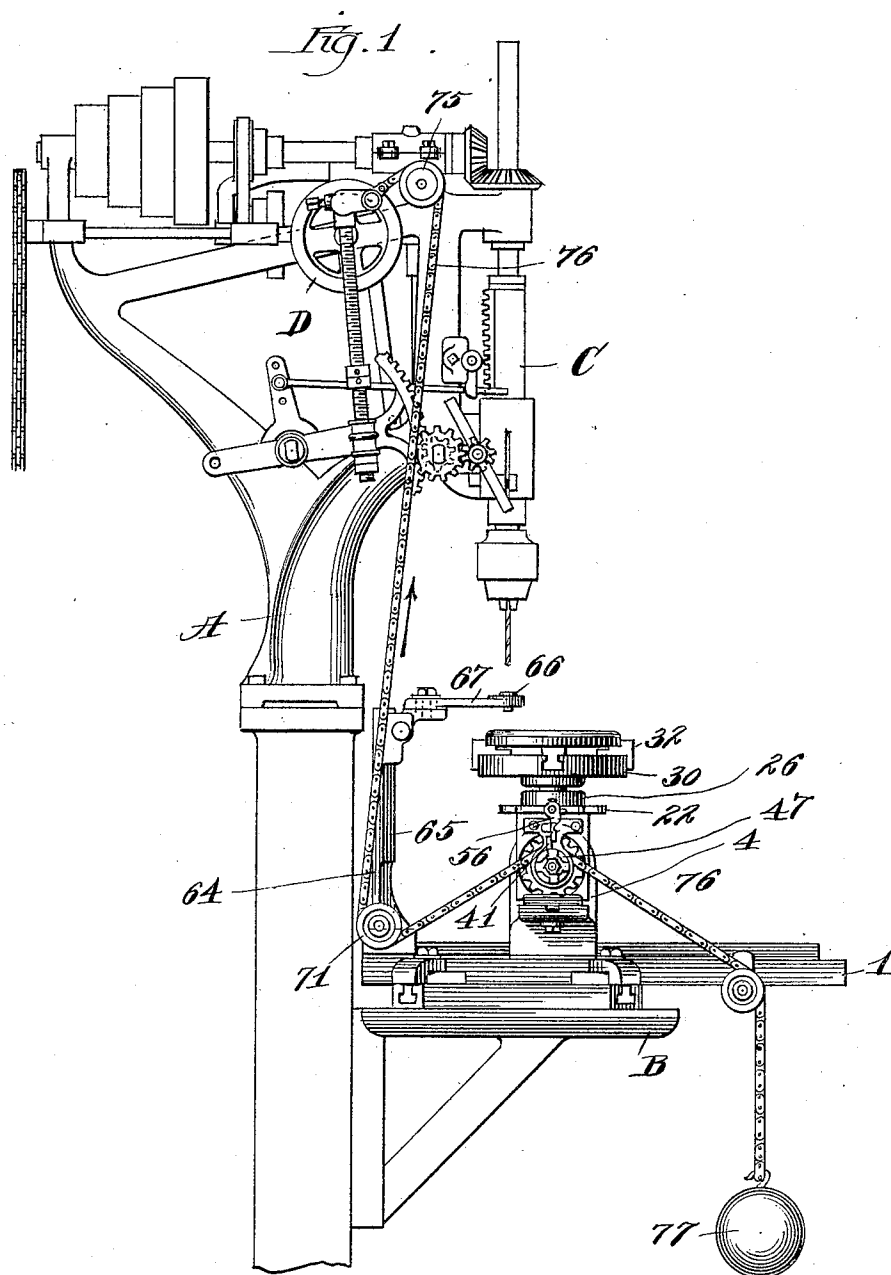


No. 804,919.

PATENTED NOV. 21, 1905.

B. F. BARNES.
AUTOMATIC CHUCK.
APPLICATION FILED JULY 14, 1904.

3 SHEETS—SHEET 1.



Witnesses:
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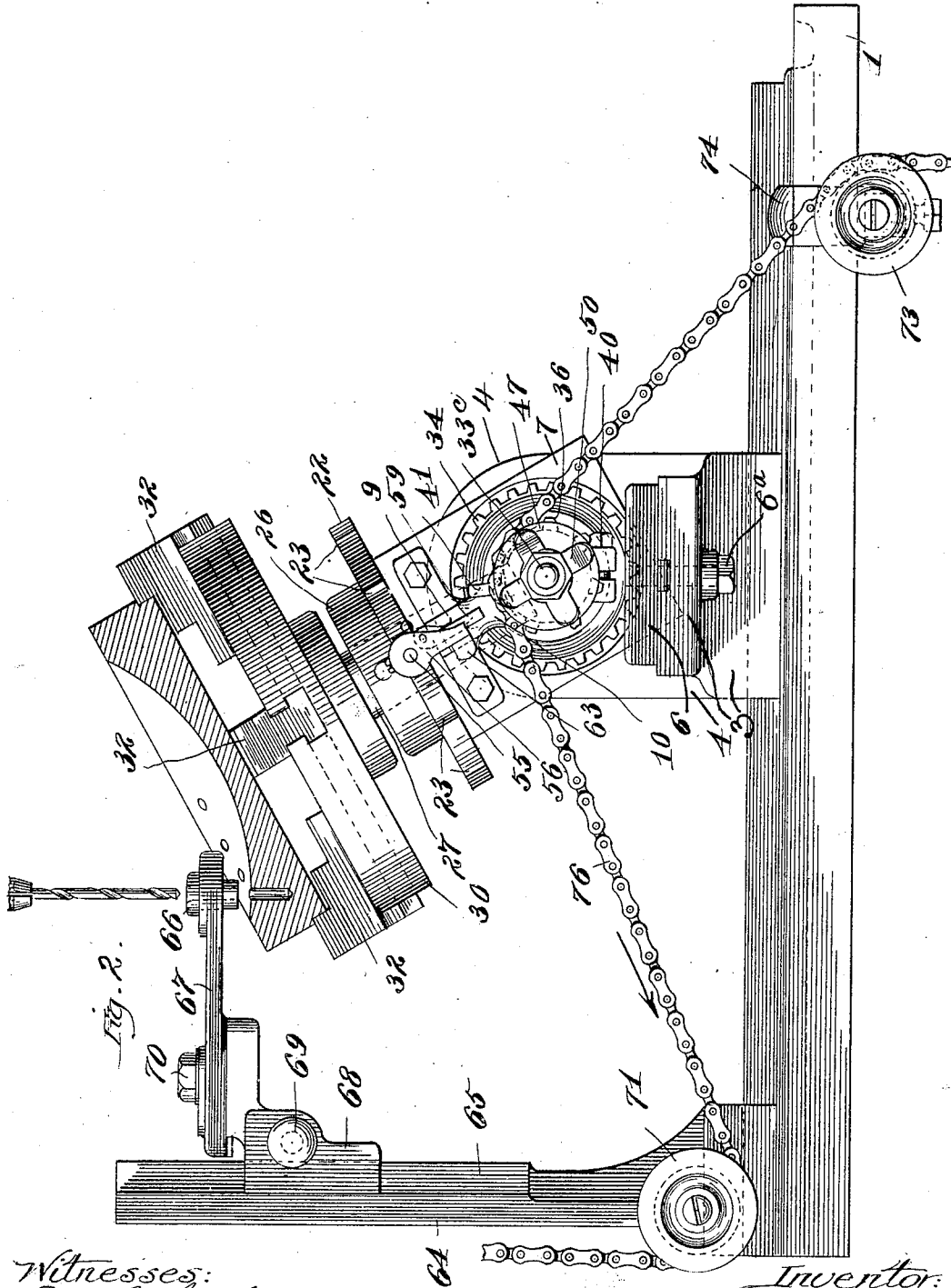
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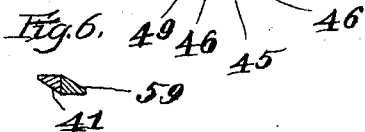
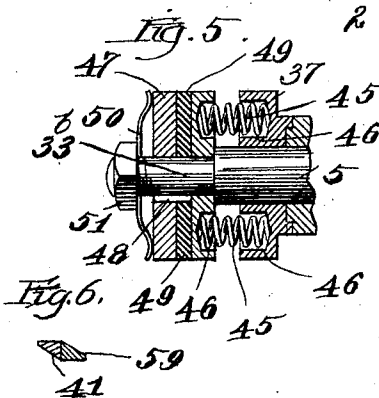
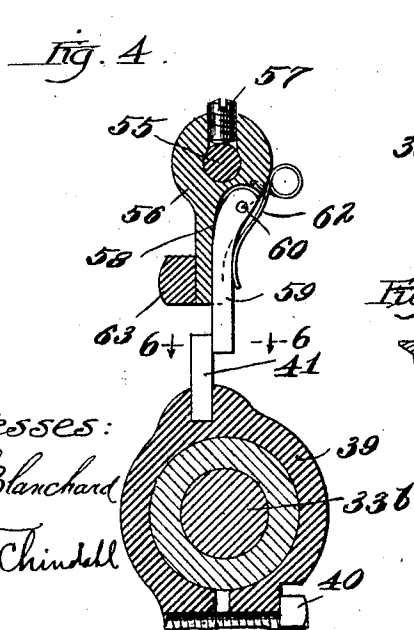
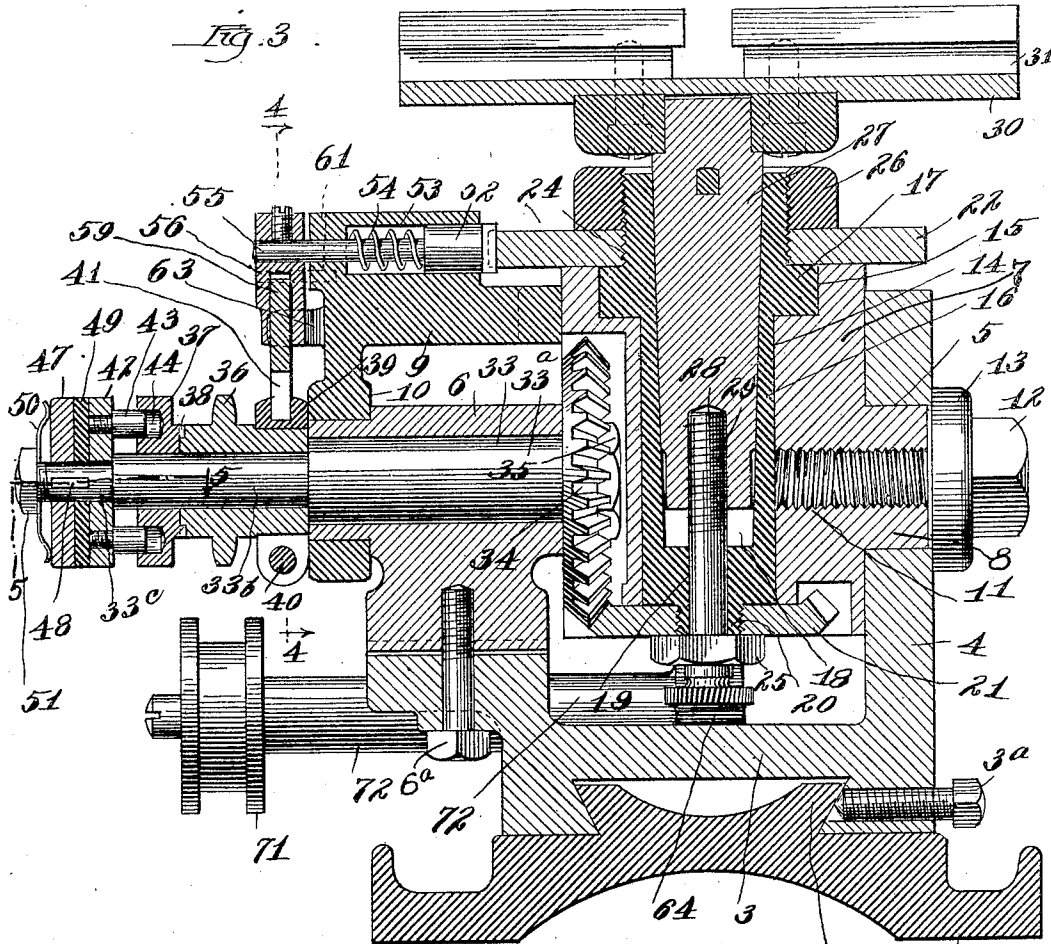


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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

BENJAMIN F. BARNES, OF ROCKPORT, ILLINOIS.

AUTOMATIC CHUCK.

No. 804,919.

Specification of Letters Patent.

Patented Nov. 21, 1905.

Application filed July 14, 1904. Serial No. 216,601.

To all whom it may concern:

Be it known that I, BENJAMIN F. BARNES, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Automatic Chucks, of which the following is a specification.

The object of this invention is the production of an automatic chuck for holding work to be operated upon by drills and other machine-tools.

The embodiment herein shown of the invention is particularly adapted for holding work upon which a number of operations are to be performed and for automatically moving such work to bring another portion of the work into proper relation to the tool when one operation has been completed.

In the accompanying drawings, Figure 1 is a side elevation of this chuck applied to a drilling-machine. Fig. 2 is a side elevation of the chuck. Fig. 3 is a transverse central section through said chuck. Fig. 4 is a detail sectional view on dotted line 4 4 of Fig. 3. Fig. 5 is a detail section through the clutch on dotted line 5 5 of Fig. 3. Fig. 6 is a transverse section on dotted line 6 6 of Fig. 4.

The chuck herein shown and described is intended to be used in connection with a drilling-machine having an automatic quick advance and return feed for the drill-spindle.

I have herein illustrated the chuck in its application to a drilling-machine of this type similar to that shown in my copending application Serial No. 158,054.

A refers to the supporting-column of the drilling-machine, B to the work-table, C to the drill-spindle, and D to an intermittently-rotated portion of the quick advance and return feed mechanism.

In the construction of a chuck embodying this invention I provide a base 1, adjustably secured to the work-table B of the drilling-machine in any suitable manner, as by the usual clamps mounted in diagonal undercut grooves in said table. Upon the upper side of the base 1 is formed a raised longitudinal gib 2, upon which the supporting-standard 3 of the chuck is adapted to slide and upon which it may be rigidly fixed by means of the set-screw 3^a. The standard 3 comprises an upright ear portion 4, having an opening 5 therein, and a bearing-sleeve 6, alined with said opening 5, said sleeve being secured to the standard 3 by means of a screw 6^a. The body portion 7 of the chuck has a cylindrical

trunnion 8 formed integral with and extending from one side of said body portion, which trunnion is adapted to lie within the opening 5 of the supporting-standard 3. The body portion 7 also comprises an arm 9, having a wing 10, fitted to the outer end of the bearing-sleeve 6, upon which wing 10 and the trunnion 8 said body portion is adapted to be oscillated. A screw-threaded opening 11 in the trunnion 8 receives a machine-bolt 12, having a washer 13 lying beneath its head in contact with the face of the ear 4, which bolt provides a means for locking the body portion 7 at any angle with relation to the supporting-standard 3 in which it is desirable to adjust said body portion.

The body portion 7 is provided with a cylindrical opening 14, having an enlarged annular upper portion 15. A socket-sleeve 16 is adapted to lie within said cylindrical opening 14, the lower face of its annular ring 17 resting upon the lower wall of the annular opening 15. The socket-sleeve 16 has an axial tapering opening 18 and a connecting-bolt opening 19. The upper end of the sleeve is exteriorly screw-threaded, and the lower end is provided with a central tubular stud 20, which stud also is exteriorly screw-threaded. A bevel-pinion 21, having a central screw-threaded opening, is adapted to be turned upon the stud 20. A locking-disk 22, having locking-notches 23 in its periphery and a central screw-threaded opening 24, is adapted to be placed upon the screw-threaded upper end of said sleeve and to lie in contact with the ring 17 of said sleeve. Locking-nuts 25 and 26 are adapted to hold said pinion and said locking-disk, respectively, in position. A tapering shank 27 lies within the tapering central opening 18 of the socket member 16 and is secured therein by means of a machine-screw 28, extending through the opening 19 in the socket member 16 and into a screw-threaded opening 29 in the lower end of said shank. A face-plate 30, having radial undercut grooves 31, with work-holding jaws 32 in said grooves, is secured in any suitable manner to the upper end of the shank 27.

A shaft 33, having a bevel-pinion 34 fixed upon its inner end, which pinion is held in place by means of a lock-nut 35, comprises three portions of different diameters—to wit, 33^a, 33^b, and 33^c. The portion 33^a lies within the bearing-sleeve 6. The portion 33^b carries a sprocket-wheel 36 and a sliding

ratchet - collar 37, in the adjacent faces of which wheel and collar ratchet clutch-teeth 38 are formed. The hub of the sprocket-wheel on the side toward the bearing-sleeve 16 is embraced by a collar 39, slotted at one side and provided with a screw 40 for clamping said collar upon said hub. Extending from the collar 39 is a finger 41, the upper end of which finger is beveled upon its side toward the bearing-sleeve 6. The portion 33° of the shaft 33 carries a friction driving-collar 42, from one side of which driving-collar project guide-pins 43, the outer ends of said guide-pins lying within openings 44, formed in the adjacent face of the ratchet-collar 37. The ratchet-collar 37 is held in clutch with the sprocket-wheel 36 by means of coil-springs 45, the ends of which springs lie within coinciding openings 46, formed in the adjacent faces of the ratchet-collar 37 and driving - collar 42. A driven collar 47 is mounted upon a feather 48 in the shaft portion 33° and is free to slide upon said feather, the contact-face of said driven collar being provided with a thickness of leather 49 or other suitable material. The driven collar 47 is held in contact with the driving-collar 42 by means of a spring-spider 50, which spider is held upon the end of the shaft 33 by means of a nut 51.

A locking-plunger 52 lies within an opening 53 in the arm 9 of the body portion 7 and is held in engagement with the periphery of the locking-disk 22 by means of a coil-spring 54. The stem 55 of the locking-plunger has an arm 56 secured thereto by means of a screw 57. In one side of this arm a recess 58 is formed for receiving a finger 59, which finger is pivotally mounted upon a pivot-pin 60, extending transversely through the arm 56 and into an opening 61 in the arm 9 in order to prevent the rotation of said arm 56. Upon one side and near its lower end the pivoted finger 59 is beveled to engage the beveled portion of the finger 41. The finger 59 is held within its recess 58 by means of a bow-spring 62. A stud 63, projecting from the arm 9, assists in guiding the finger 59 in its sliding movement.

Near one of its ends the gib 2 of the base 1 carries an upwardly-extending arm 64, having formed thereon the guide 65. A guide-sleeve 66 for the drill is mounted upon the forward end of an arm 67, which arm is supported in a bracket 68, and this bracket is adapted to have a vertical movement upon the gib 65 of the arm 64, the bolts 69 and 70 providing, respectively, a vertical and a horizontal adjustment of said arm. A sheave 71, alined with the sprocket-wheel 36, is rotatably mounted upon an arm 72, projecting from the guide-arm 64, and a similar sheave 73 is carried by a bracket 74, adjustably secured to the base 1. Upon the frame-work of the drilling-machine a similar sheave

75 is mounted. A length of chain belting 76, one end of which is connected to an intermittently-reciprocated part, as D, of the quick advance and return feed mechanism for the drill-spindle and the other end of which chain carries a weight-ball 77, passes over the sheave 75 on the drill-frame, under the sheave 71, over the sprocket-wheel 36, engaging the teeth thereof, and over the sheave 73. The sprocket-wheel 36 is of such diameter with relation to the extent of movement of the chain 76 that said wheel is rotated through only a part of a revolution.

As hereinbefore stated, this chuck is designed for use with an automatic quick advance and return feed - drill of a pattern similar to that shown in my copending application Serial No. 158,054, one end of the chain 76 being pivotally attached to the drive-gear D for said quick feed. This gear rotates through half a revolution to produce each quick advance or quick return feed movement of the spindle, thus moving the chain 76 to rotate the chuck when the drill is approaching its work. During the work-feed movement of the spindle said gear is locked from rotation. In Fig. 1 the gear is shown in the position it occupies when the spindle is raised. In lowering the spindle to its work the gear is rotated by the drill mechanism one - half a revolution, moving the chain 76, as indicated by the arrow in Figs. 1 and 2. When the chain is so moved—that is, during the quick advance movement of the drill-spindle—the finger 41 of the collar 39, impinging upon the beveled end of the pivoted finger 59, slides said finger and the arm 56, withdrawing the spring-locking plunger 52 from engagement with one of the locking-notches 23 in the periphery of the locking-disk 22. This frees the face-plate 30 and permits its rotation by the friction drive transmitted from the sprocket - wheel 36 through the ratchet-collar 37 and the friction-collars 42 and 47 to the shaft 33, the gears 34 and 21, and the socket-sleeve 16. The locking-disk 22 is rotated until the locking-plunger 52 enters the next adjacent locking-notch, when the disk is positively stopped and the friction-collar 42 slips upon the collar 47. During the movement of the chain 76 in the direction contrary to that indicated by the arrows in Figs. 1 and 2 the finger 41, striking the rear side of the pivoted finger 59, swings said finger upon its pivot and against the action of its spring 62 a sufficient distance to permit the finger 41 to pass said finger 59. During the last-mentioned movement of the chain 76 the ratchet-clutch teeth 38 on the sprocket-wheel 36 and the ratchet-collar 37 separate, said ratchet-collar sliding outwardly upon the shaft 33 against the tension of the coil-springs 45.

Separate small pieces of work may be mounted upon the face-plate 30 for operation

by providing a jig to hold them. Locking-disks with locking-notches at different points upon their peripheries are provided for different pieces of work.

5 Since in the construction and application herein shown the chain 76 has a fixed range of movement, while the face-plate 30 is adapted, by means of special locking-disks, to be rotated through various arcs of a circle, it is
10 evident that some form of yielding or slipping connection must be provided between the rotating means and the driving means. The means herein shown comprises the friction-clutch 42 47; but it is apparent that
15 other yielding or slipping connections might be substituted therefor.

The face-plate 30 may be tilted to one side or the other of a vertical line by loosening the locking-screw 12 and turning the body portion 7 of the chuck with relation to the supporting-standard 3. The body portion may
20 be locked in any position with relation to said supporting-standard by tightening the bolt 12.

25 Various changes may be made in the form and arrangement of the parts of this chuck without departing from the spirit and scope of my invention. Therefore I desire to have it understood that I do not limit myself to the precise details herein shown and described.
30 I claim as my invention—

1. In an automatic chuck, in combination, a work-holding means; means for rotating said work-holding means; a driving means
35 having a yielding connection with said rotating means; means adapted to be operatively connected with an operating mechanism for intermittently actuating said driving means in opposite directions; means for locking
40 said work-holding means against rotation; and means operated by said driving means for releasing said work-holding means to rotation during the actuation of said driving means in one direction.

45 2. In a machine-tool, in combination, a drill-spindle; means for reciprocating said spindle; a chuck; means for moving said chuck; a driving means actuated by said spindle-reciprocating means, said driving
50 means being driven in one direction during the movement of said spindle in one direction, and in the opposite direction during the movement of said spindle in the opposite direction, said driving means having a yielding
55 connection with said chuck-moving means; means for locking said chuck against movement; and means for releasing said chuck to movement.

3. In a machine-tool, in combination, a
60 tool-spindle; means for reciprocating said spindle; a chuck; means for rotating said chuck comprising a sprocket having a frictional driving connection with the remainder of said rotating means; means for locking said
65 chuck against rotation; means for releasing

said chuck to rotation; and a chain arranged to be reciprocated with said tool-spindle for rotating said sprocket-wheel.

4. In an automatic chuck, in combination, work-holding means; means for rotating
70 said work-holding means comprising a sprocket-wheel having a yielding driving connection with the remainder of said rotating means; means for locking said work-holding means against rotation; a reciprocatory chain for rotating said sprocket-wheel
75 alternately in opposite directions; and means moving with said sprocket-wheel, adapted to release said work-holding means to rotation upon a rotation of said sprocket-wheel
80 in one direction.

5. In an automatic chuck, in combination, work-holding means; a shaft for rotating said work-holding means; a sprocket-wheel rotatably mounted on said shaft; a friction-
85 clutch member on said shaft arranged to rotate therewith; a coacting friction-clutch member on said shaft adapted to have a driving connection with said sprocket-wheel; a spring for holding said friction-clutch
90 members in contact; means for rotating said sprocket-wheel; and means for locking said work-holding means against rotation.

6. In an automatic chuck, in combination, a supporting-standard; a shaft rotatably
95 mounted in said standard; work-holding means; a support in which said work-holding means is rotatably mounted, said support being pivotally mounted in said standard concentrically with said shaft, and the
100 rotative axes of said work-holding means and said shaft intersecting each other; a bevel-gear connection between said shaft and said work-holding means for rotating the latter; and means for rotating said shaft.
105

7. In an automatic chuck, in combination, a supporting-standard; a shaft rotatably
110 mounted in said standard; work-holding means; a support for said work-holding means pivotally mounted in said supporting-standard, said shaft being operatively connected with said work-holding means for rotating the latter; means for rotating said shaft; a locking-disk fixed with relation to
115 said work-holding means and provided in its periphery with locking-notches; a spring-plunger slidably mounted in the pivoted support for said work-holding means and adapted to engage said notches; and means actuated by said shaft for moving said plunger to
120 release the work-holding means to rotation.

8. In an automatic chuck, in combination, a supporting-standard; a shaft rotatably
125 mounted in said standard; work-holding means; a support for said work-holding means pivotally mounted in said supporting-standard concentrically with said shaft, said shaft being operatively connected with said work-holding means for rotating the latter; means for rotating said shaft; means for lock-
130

ing said work-holding means against rotation; and means actuated by said shaft for releasing the work-holding means to rotation.

9. In an automatic chuck, in combination,
5 work-holding means; a shaft for rotating said work-holding means; a sprocket-wheel rotatably mounted on said shaft; a friction-clutch member on said shaft arranged to rotate therewith; a collar loosely mounted on
10 said shaft and adapted to have a ratchet-clutch connection with said sprocket-wheel; a friction-clutch collar loosely mounted on said shaft and arranged to have a driving connection with said first-mentioned collar;
15 a spring for holding said friction-clutch collar toward the first-mentioned friction-clutch member; means for rotating said sprocket-wheel alternately in opposite directions; and means for locking said work-holding
20 means against rotation.

10. In an automatic chuck, in combination, a work-holding means; a shaft operatively connected with said work-holding means for rotating it; a wheel rotatably
25 mounted on said shaft and adapted to have a frictional driving connection therewith; means for rotating said wheel; a locking-disk fixed with relation to said work-holding means and provided in its periphery with

locking-notches; a plunger adapted to engage said notches; a spring for holding said
30 plunger in engagement with said notches; a finger fixed with relation to said wheel; a member mounted on said plunger in position to be engaged by said finger, which member
35 is adapted to move said plunger when engaged by said finger moving in one direction, and to yield when engaged by said finger moving in the opposite direction; and means
40 for rotating said wheel alternately in opposite directions.

11. In an automatic chuck, in combination, work-holding means; a shaft for rotating said work-holding means; a sprocket-wheel rotatably mounted on said shaft; a
45 friction-clutch member on said shaft arranged to rotate therewith; a coacting friction-clutch member on said shaft adapted to have a ratchet connection with said sprocket-wheel; means for rotating said sprocket-wheel
50 alternately in opposite directions; and means for locking said work-holding means against rotation.

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