Jan. 8, 1929. 1,698,254

E. P. BULLARD, JR

POWER CHUCK

Filed Feb. 9, 1925 4 Sheets-Sheet 1

Fig. 1

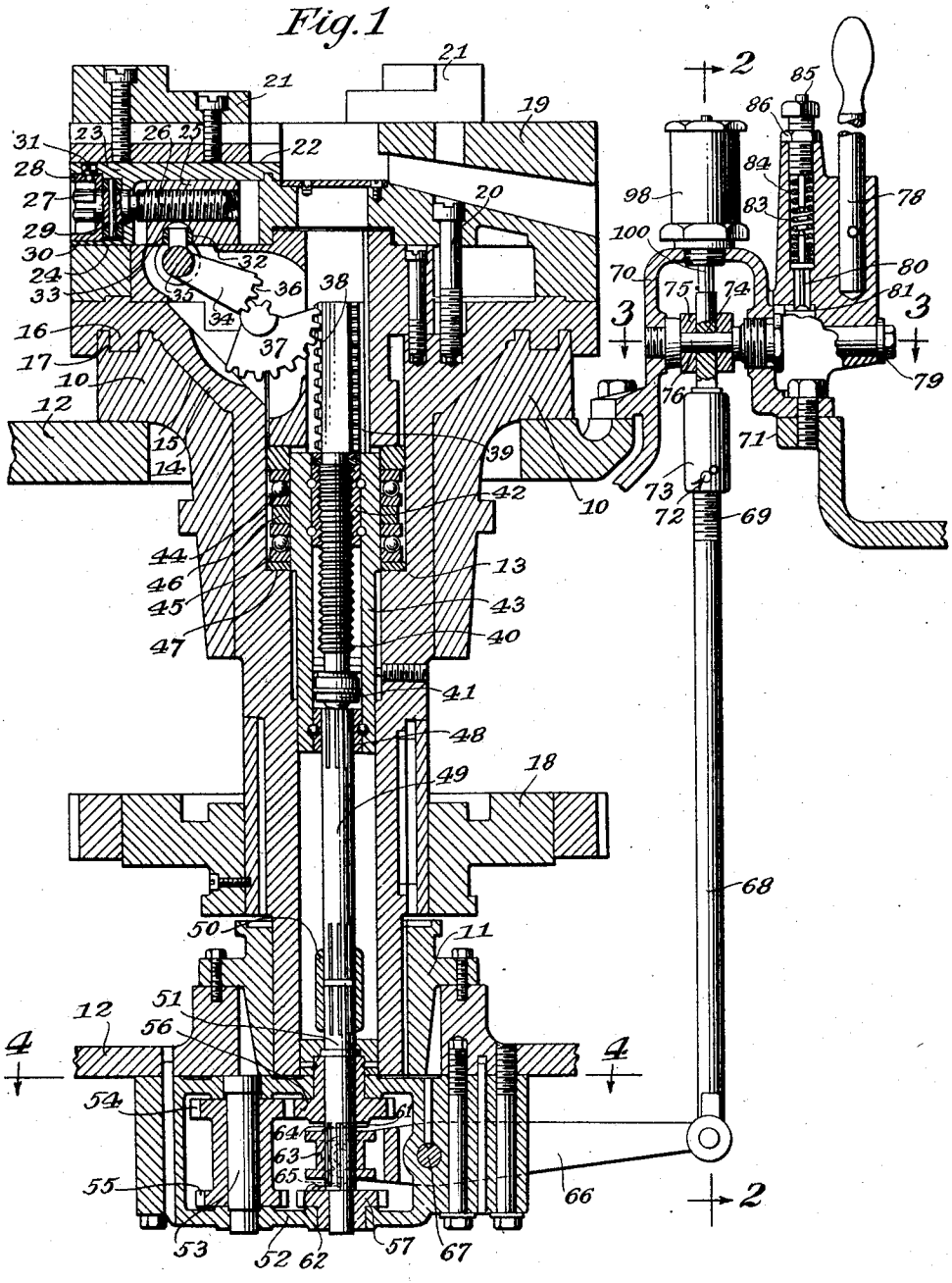
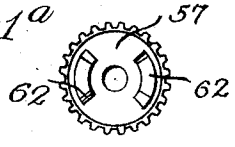


Fig 1a



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POWER CHUCK

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Fig. 2

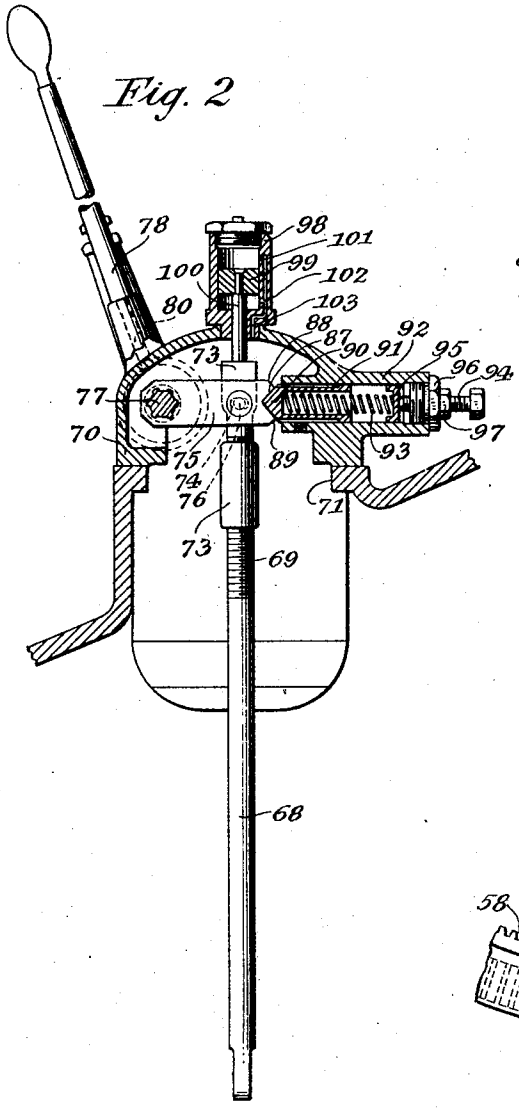


Fig. 3

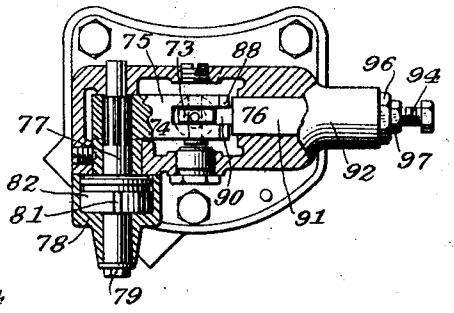
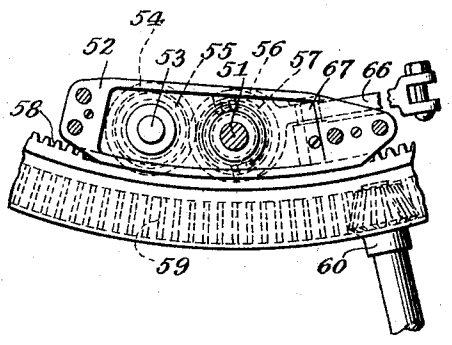


Fig. 4



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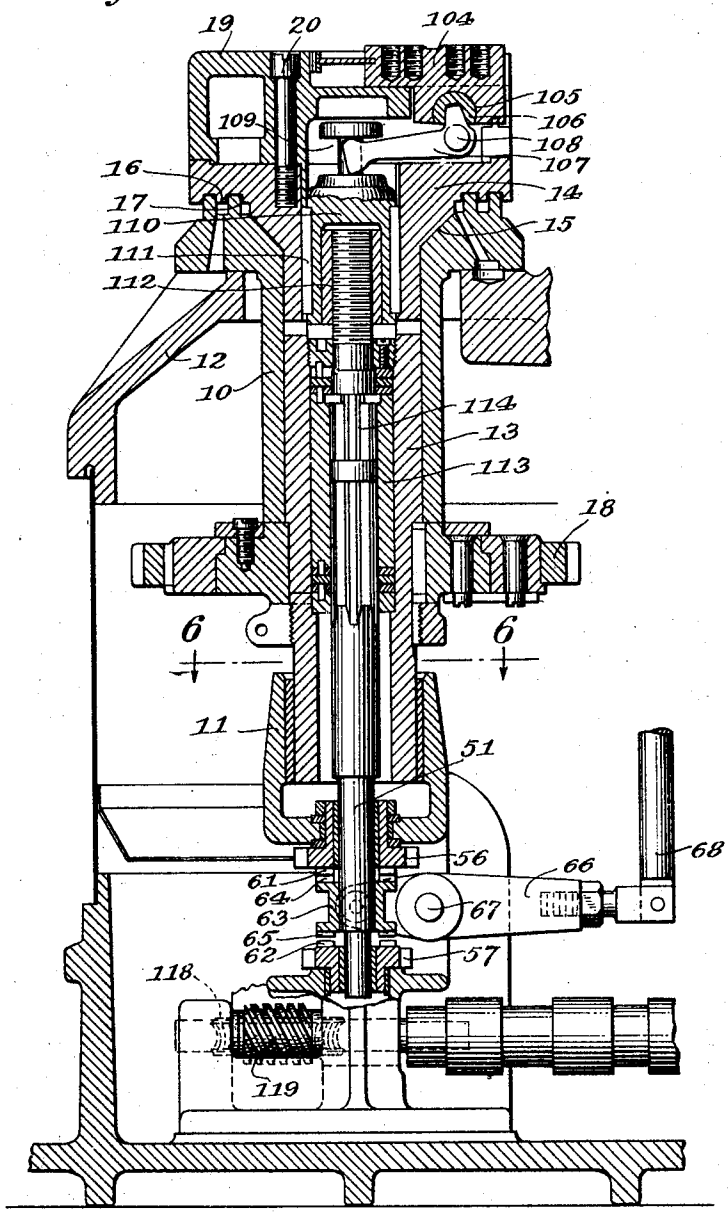
Jan. 8, 1929. 1,698,254

E. P. BULLARD, JR

POWER CHUCK

Filed Feb. 9, 1925 4 Sheets-Sheet 3

Fig. 5



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Jan. 8, 1929. 1,698,254

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POWER CHUCK

Filed Feb. 9, 1925 4 Sheets-Sheet 4

Fig. 6

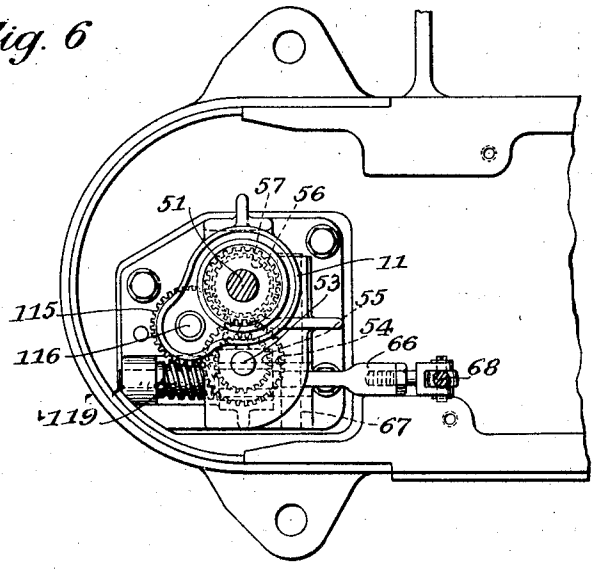


Fig. 7

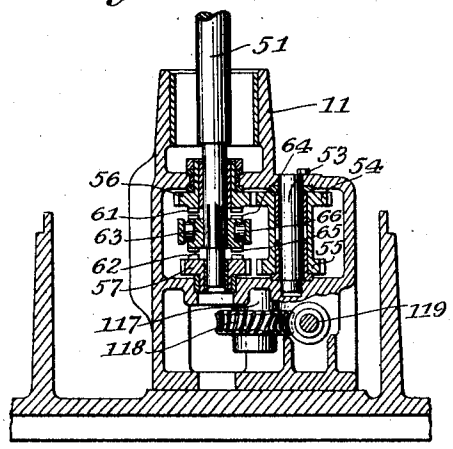
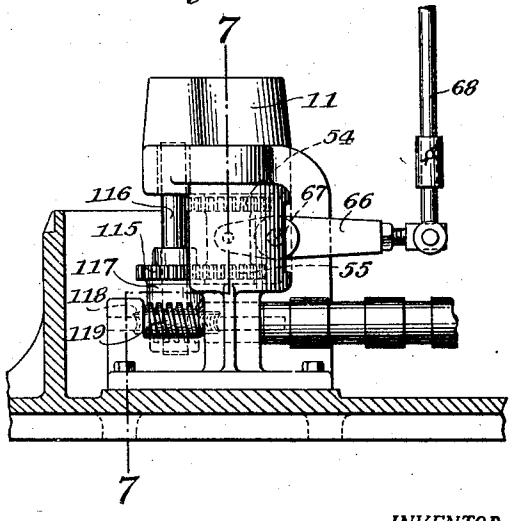


Fig. 8



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Patented Jan. 8, 1929. 1,698,254

UNITED STATES PATENT OFFICE.

EDWARD P. BULLARD, JR., OF STRATFORD, CONNECTICUT, ASSIGNOR TO THE BULLARD MACHINE TOOL COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF CONNECTICUT.

POWER CHUCK.

Application filed February 9, 1925. Serial No. 7,896.

This invention relates to an improved chuck and operating means therefor, and particularly a mechanical chucking mechanism for turning or spindle machines, the present application being a division, in part, of my application Serial Number 680,180, filed December 12, 1923. It will be understood that the invention, according to the present embodiments, may be used with various types of machines, as multiple or single spindle turning machines, stationary or rotatable drills, or the like.

An object of the invention is to provide a chucking mechanism operated by the power of the machine, and which may be controlled with facility and precision. A further object is to provide a mechanism which will be positive in operation, will operate at adjustable predetermined gripping pressures, and which will stop automatically as the chuck jaws reach the limits of their open or closed positions; and furthermore, to insure such stopping at all times, irrespective of any actions of the operator, as for instance, when he holds the operating lever in either opening or closing position, after the limit of such positions has been reached.

With the above and other objects in view, an embodiment of the invention is shown in the accompanying drawings, and this embodiment will be hereinafter more fully described with reference thereto, and the invention will be finally pointed out in the claims.

In the drawings:—

Fig. 1 is a vertical sectional view of a spindle machine work table, showing the chuck and operating mechanism therefor, according to one embodiment of the invention;

Fig. 1[a] is a plan view of one of the gears employed;

Fig. 2 is a vertical sectional view of the operating means, taken along the line 2—2 of Fig. 1;

Fig. 3 is a horizontal sectional view, taken along the line 3—3 of Fig. 1;

Fig. 4 is a horizontal plan view of the chuck operating means, taken along the line 4—4 of Fig. 1, and showing the drive means therefor;

Fig. 5 is a vertical sectional view of the chuck and operating mechanism, according to a modified form of the invention;

Fig. 6 is a horizontal sectional plan view of the operating gears and drive means, taken along the line 6—6 of Fig. 5;

Fig. 7 is a vertical sectional view of the parts shown in Fig. 6, and taken along the line 7—7 of Fig. 8; and

Fig. 8 is a side elevation, partly in section, of the parts as shown in Fig. 6.

Similar reference characters indicate corresponding parts throughout the several figures of the drawings.

The chucking mechanism constituting the present invention, is adapted for use either in relation with a multiple spindle machine of the type shown in my original application, above referred to, or it may be incorporated in a single spindle machine. I have herein disclosed the mechanism as adapted for either application. In such machines the operator must remove the finished work and replace it with a new piece between each operation of the machine, and heretofore with certain types of machines he has also been required to operate the chuck jaws by means of a hand wrench, so as to first release the finished work and then grip the new piece, which operations necessarily consume time, add to the fatigue of the operator, and thus reduce the efficiency of the machine. Such manual chucking is furthermore inconsistent with a machine having a continuously moving carrier, inasmuch as the operator must devote the greater part of the time, while the tables are moving in relation to the loading stations, to removing the work and replacing the same. As will be apparent from the following description, the operator of the present machine is only required to throw a lever, to cause the chuck jaws to open or close, the actual operation of the jaws being carried out by mechanical means.

The work carrying table is rotatably supported in bearings 10 and 11 of the support 12, and comprises a vertical tubular spindle 13 provided at its upper end with a central conical portion 14, engaging a conical seat 15 of the bearing 10, and an annular grooved flange 16 rotatably engaging an annular ribbed portion 17 of the bearing 10.

The spindle is provided adjacent the bearing 11 with a gear 18 keyed thereto, and adapted through suitable drive means (not shown) to rotate the spindle, this drive means being such as to be inoperative dur-

ing the operation of the chucking mechanism, so that the spindle is stationary while the operator removes the finished work and places a new piece in the chuck.

At the upper end of the spindle 13 there is mounted the work carrying table 19, secured thereto by bolts 20, and provided with radial chuck jaws 21, adjustably secured in the T-slots 22 of chuck slides 23 movable outwardly and inwardly in slideways 24 of the table. A nut 25 is secured to the underside of each slide, and may be adjusted longitudinally with respect thereto by means of a screw 26 engaging the nut, and having an exposed squared head 27 disposed in a pocket 28 of the slide, the screw being fixed against longitudinal movement by means of a ring 29 secured thereto, and engaged within the pocket, and a retaining cup-shaped member 30 secured within the pocket by set-screws 31.

The nut is provided at its under side with a cylindrical recess 32, having a recessed rotatable bearing 33 therein engaged by the short arm of a bell-crank lever 34, provided with trunnions 35 having bearing in the table, the long arm of said lever being provided at its end with teeth 36 meshing with the short radius portion of a combination toothed segment 37, also having bearing in the table. The long radius portion of the segment meshes with a vertically reciprocating rack 38 disposed in the spindle, this rack being of triangular shape to simultaneously operate the several chuck jaws, and being held against rotation relatively to the table by means of a key 39.

The rack is provided with a downwardly extending threaded shank 40 provided at its lower end with a thrust bearing 41, and engaged by a nut 42 secured within a rotating sleeve 43, having bearing within the spindle between anti-friction ball-bearings 44 and 45, disposed above and below a collar 46 of the sleeve, and supported within a recessed portion 47 of the spindle.

The sleeve extends below the threaded shank 40 and is splined, as at 48, to the upper end of a shaft 49, extending downwardly through the spindle, and which in turn is coupled, as at 50 to a shaft 51, rotatably supported within a bracket or cage 52 bolted to the carrier beneath the lower end of the spindle.

The cage is provided at one side of the shaft 51 with a vertical shaft 53 upon which are mounted integrally connected upper and lower gears 54 and 55, the lower of which is of smaller diameter, while upon the shaft 51 there are provided spaced gears 56 and 57 corresponding in size to the gears 54 and 55, the upper gears 54 and 56 being in mesh with each other. The lower gears 55 and 57 are in mesh with an internally toothed ring gear 58, (Fig. 4), provided at its under side with beveled teeth 59, and continuously driven by a beveled pinion 60. In a multiple spindle machine, the gear 58 extends about the machine and drives the gears 55 and 57 of each spindle. It will thus be seen that gears 55 and 57 are continuously driven during the operation of the machine, and that the gear 56 is driven through the intermediate gear 54 in an opposite direction to the gear 57.

The gears 56 and 57 are provided upon each of their opposed faces with clutch teeth 61 and 62, having beveled ends, and between these gears the shaft 51 is provided with a flanged clutch collar 63 splined thereto and having vertical movement on the shaft, said collar being provided upon its upper and lower faces with clutch teeth 64 and 65 having beveled ends, and adapted to be raised and lowered by mechanism to be presently described, from its normal non-engaging or neutral position into engagement with either of the respective gears 56 and 57, to thereby form a driving connection between either of the gears and the shaft 51.

It is obvious that upon engagement of the clutch collar with one or the other gears 56 and 57, the shaft 51 and the nut 42 connected therewith will be rotated in one or the other directions, and that the rack 38 will be reciprocated either upwardly or downwardly, moving the chuck jaws, through the segment 37 and bell-crank lever 34, into open or closed position. As the chuck jaws reach the limit of their movement, further movement of the rack and rotation of the nut, shaft 51, and clutch collar, is prevented, so that the continued rotation of the gear engaged by the clutch collar causes the latter to be cammed to its neutral or nonmeshing position, through the action of the beveled end surfaces of the clutch teeth. In order to prevent the clutch collar, after it has been disengaged from one gear, from moving into engagement with the other, and thereby causing a continued opening and closing of the chuck-jaws, a dash-pot movement-retarding mechanism, hereinafter more fully referred to, is connected to the clutch collar operating mechanism and effectually stops the collar from moving beyond its neutral position.

The clutch collar is engaged by the rollered yoke end of a lever 66 pivotally mounted at 67 in the cage 52, and having its projected end connected to a vertical operating shaft 68. The shaft 68 is threaded at its upper end, as at 69, and extends into a casing 70 secured by bolts within an opening 71 of the carrier, at one side of the work carrying table, said threaded end 69 being adjustably connected by a cotter-pinned coupling 72 to a vertical extension 73, having a slot 74 therein, and

to which a forked lever arm 75 is connected by means of a pin 76. The lever arm is splined upon a horizontal shaft 77, journaled in the casing, and upon one end thereof an operating handle 78 is rotatably secured by means of a nut and washer 79, said handle being operatively connected to the shaft, to impart rotary movement thereto, by means of a pawl 80, having a V-shaped engaging end normally engaged in a notch 81 provided in a flange 82 of the shaft. The pawl is normally pressed into engagement with said notch by means of a spring 83 disposed in a passage 84 provided in the handle, and adjustable as to pressure by means of a pressure screw 85, adapted to be fixed in adjusted position by means of a lock nut 86.

The swinging end of the lever arm 75 is provided with a V-shaped notch 87 and beveled surfaces 88 and 89 above and below said notch, and is engaged by the V-shaped end 90 of a spring-pressed detent 91 slidably mounted in a tubular boss 92 formed in the casing. A spring 93 normally exerts an outward pressure on the detent and may be adjusted as to pressure by means of a pressure screw 94 bearing upon a cap member 95 engaging the inner end of the spring, said screw working through a cap screw 96 and adapted to be fixed in adjusted position by means of a lock nut 97.

The pressure of the spring 83 is greater than that of the spring 93, so that upon movement of the handle from its neutral or intermediate position to its operative position in either direction to open or close the chuck jaws, the detent will be pressed inwardly releasing the lever arm 75. The pressure of the spring 83 is such, however, as to permit pressing in of the pawl 80, and independent movement of the shaft 77 and lever arm 75, in the event that the operator does not release his hand from the handle prior to the automatic return of the shaft 68 to neutral position.

The detent 91, in addition to yieldably retaining the lever arm 75 in either its neutral or moved operative positions, also acts to move it and its associated mechanism with a quick snap action to its neutral or operative positions after a preliminary imparted movement, this snap action occurring at the moment the point of the detent passes the pointed ends of the notch 87.

In order to prevent any return movement, beyond the neutral position, which would result in successive opening and closing of the chuck jaws, as above referred to, a dash-pot mechanism, acting in the nature of a brake, is provided. This consists of a dash-pot 98 mounted upon the upper end of the casing 70, and provided with a plunger 99 connected by a plunger rod 100 to the member 73 at the upper end of the shaft 68, ports 101 and 102 being provided in the cylindrical wall of the dash-pot above and below the plunger and in communication with the interior of the casing 70 through the passage 103. The arrangement of the ports prevents particles of metal produced by the machining operations on the work from entering the chamber of the dash-pot. As the plunger is moved to its upper or lower position, upon movement of the operating mechanism to open or close the chuck jaws, one of the ports 101 and 102 is closed, so that upon the return to neutral position a vacuum is produced behind the plunger, and its movement is therefore retarded.

In Figs. 5 to 8 there is illustrated an embodiment of the invention in which a modified form of chuck actuating mechanism is provided, and in which the driving means for the chuck operating mechanism is individual to a single mechanism, and therefore especially adapted for use with a single spindle machine. It will be understood that either of the chucks illustrated may be employed with either of the drive means.

The work table 19 is provided with radial chuck jaws 104, movable in slideways in the table in a similar manner to the first embodiment, and each provided at its under side with a cylindrical recess 105 having a recessed rotatable bearing 106 therein engaged by the short arm of a bell-crank lever 107, provided with trunnions 108 having bearing in the table, the long arm of said lever being engaged in an annular recess 109 provided at the upper end of a slide member 110, keyed for vertical sliding movement in the central passage 111 of the table and having an interiorly threaded bushing 112 secured therein. To the splined shaft 51 there is coupled, by means of a sleeve 113, a splined shaft 114 having its upper end threaded and engaged in the interiorly threaded bushing 112 of the member 110. In operation, rotation of the shaft 51 in one or the other directions causes the member 110 to be raised or lowered, and through the bell-crank opens or closes the chuck jaws.

The drive means for continuously rotating the chuck operating mechanism consists of a gear 115 meshing with both the gear 55 and the gear 57, the shaft 116 of said gear 115, which is journaled in a suitable bearing portion 117, having a spiral gear 118 secured thereon, with which there is engaged a continuously driven worm 119 driven from a suitable source of power.

I have illustrated and described preferred and satisfactory embodiments of the invention, but it will be understood that changes may be made therein, within the spirit and scope thereof, as defined in the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a chucking device, a work table, chuck jaws carried thereby, a tubular spindle for said table, means for operating the jaws to grip and release the work including a shaft coaxial within said spindle, and rotatable with relation thereto and reversely moving gears coaxial with said shaft, and resistance operated means for automatically disconnecting said respective gears when the chuck jaws have been opened or closed.

2. In a chucking device, a work table, chuck jaws carried thereby, a tubular spindle for said table, means for operating the jaws to grip and release the work including a shaft coaxial within said spindle, and rotatable with relation thereto and reversely moving gears coaxial with said shaft, resistance operated means for automatically disconnecting said respective gears when the chuck jaws have been opened or closed, and means for regulating the resistance necessary to disconnect said gears whereby a greater or less gripping action is produced.

3. In a chucking device, a work table, chuck jaws carried thereby, positive drive means for operating the jaws to grip and release the work, and resistance operated means for automatically disconnecting said operating means at a predetermined resistance when the chuck jaws have been opened or closed.

4. In a chucking device, a work table, chuck jaws carried thereby, positive drive means for operating the jaws to grip and release the work, means for operatively connecting said operating means to operate in one or the other directions, and resistance operated means for automatically disconnecting said operating means when the chuck jaws have been opened or closed.

5. In a chucking device, a work table, chuck jaws carried thereby, means for operating the jaws to grip and release the work, manually operated means individually associated with said work table for operatively connecting said operating means to operate in one or the other directions, and resistance operated means for automatically disconnecting said operating means when the chuck jaws have been opened or closed.

6. In a chucking device, a work table, chuck jaws carried thereby, means for operating the jaws to grip and release the work, manually operated means for operatively connecting said operating means to operate in one or the other directions, resistance operated means for automatically disconnecting said operating means when the chuck jaws have been opened or closed, and a yieldable connecting means for said manually operated means whereby said resistance operated means functions irrespective of the position of said manually operated means.

7. In a chucking device, a work table, chuck jaws carried thereby, a tubular spindle for said work table, a rotatable shaft coaxial within said spindle and rotatable with relation thereto adapted to be rotated in one or the other directions to open and close the chuck jaw, a pair of drive members coaxial with said spindle adapted to be continuously driven in forward and reverse directions, a clutch for connecting said spindle to one or the other of said drive members, and manually operatable means for selectively actuating said clutch.

8. In a chucking device, a work table, chuck jaws carried thereby, a rotatable spindle adapted to be rotated in one or the other directions to open and close the chuck jaws, a pair of drive members adapted to be continuously driven in forward and reverse directions, a clutch for connecting said spindle to one of the other of said drive members, manually operable means for selectively actuating said clutch, and driving connections between said clutch and gears having camming surfaces adapted upon stoppage of the spindle to move said clutch to neutral position out of engagement with said drive member.

9. In a chucking device, a work table, chuck jaws carried thereby, a tubular spindle for said work table, a rotatable shaft coaxial within said spindle adapted to be rotated in one or the other directions to open and close the chuck jaws, a pair of spaced drive members rotatably and loosely mounted coaxially on said shaft, means for continuously driving said members in forward and reverse directions respectively, a clutch member slidably keyed on said shaft between said drive members, and manually operable means for selectively moving said clutch member into connection with either of said drive members to rotate said shaft in one or the other directions.

10. In a chucking device, work table, chuck jaws carried thereby, a rotatable spindle adapted to be rotated in one or the other directions to open and close the chuck jaws, a pair of spaced drive members rotatably and loosely mounted coaxially on said spindle, clutch teeth on the opposed faces of said members, means for continuously driving said members in forward and reverse directions, a clutch member slidably keyed on said spindle between said drive members and having clutch teeth on its faces in opposed relation to said teeth of the spaced members, and manually operable means for selectively moving said clutch member into connection with either of said drive members to rotate said spindle in one or the other directions.

11. In a chucking device, a work table, chuck jaws carried thereby, a rotatable spindle adapted to be rotated in one or the other directions to open and close the chuck jaws, a pair of spaced drive members rotatably

and loosely mounted coaxially on said spindle, clutch teeth on the opposed faces of said members, having beveled engaging surfaces, means for continuously driving said members in forward and reverse directions, a clutch member slidably keyed on said spindle between said drive members and having clutch teeth on its faces in opposed relation to said teeth of the spaced members, said teeth having beveled engaging surfaces, and manually operable means for selectively moving said clutch member into connection with either of said drive members to rotate said spindle in one or the other directions, said beveled surfaces of the teeth adapted upon stoppage of the spindle to move said clutch to neutral position out of engagement with said drive member.

12. In a chucking device, a work table, chuck jaws carried thereby, a rotatable spindle adapted to be rotated in one or the other directions to open and close the chuck jaws, a pair of gears rotatably and loosely mounted on said spindle, a pair of coaxial connected gears at one side of said spindle, one of said gears being in mesh with one of said gears on said spindle, the other gear being out of mesh and in the same plane as the other gear on the spindle, a driving gear meshing with and driving said non-meshing gears, whereby one of the gears on the spindle is driven in one direction, and the other in reverse direction, and clutch means adapted to be selectively actuated to connect one or the other of said gears to said spindle to drive the same in one or the other directions.

13. In a chucking device, a work table, chuck jaws slidably mounted thereon, a vertically reciprocating rack, gearing between said rack and the chuck jaws comprising a pivoted bell crank lever having its short arm connected to the chuck jaws and its long arm toothed at its end, and a combination segment having a short radius toothed portion meshing with said teeth of the lever and a long radius toothed portion meshing with said rack, whereby said jaws are moved to open and closed position as the rack is moved in one or the other directions, and means for moving said rack selectively in one or the other directions.

14. In a chucking device, a work table, chuck jaws carried thereby, power driven means operable in forward and reverse directions to open and close said chuck jaws, a clutch adapted to be moved in one or the other directions to connect said power driven means to operate in forward or reverse directions, and means for manually operating said clutch comprising a manually controlled member adapted to normally occupy a neutral position, movement imparting means between said control member and clutch, said control member adapted to be moved from said neutral position in either direction to move said clutch into either of its operative positions, and yieldable means for retaining said control member and clutch in their neutral and operative positions, and adapted to impart a quick snap movement to said control member and clutch to move them to their neutral and operative positions after a preliminary applied movement.

15. In a chucking device, a work table, chuck jaws carried thereby, power driven means operable in forward and reverse directions to open and close said chuck jaws, a clutch adapted to be moved in one or the other directions to connect said power driven means to operate in forward or reverse directions, and means for manually operating said clutch comprising a manually controlled member adapted to normally occupy a neutral position, movement imparting means between said control member and clutch, said control member adapted to be moved from said neutral position in either direction to move said clutch into either of its operative positions, and means adapted to automatically return said clutch and control member to neutral position upon the limit of the chuck jaw movement being reached.

16. In a chucking device, a work table, chuck jaws carried thereby, power driven means operable in forward and reverse directions to open and close said chuck jaws, a clutch adapted to be moved in one or the other directions to connect said power driven means to operate in forward and reverse directions, and means for manually operating said clutch comprising a manually controlled member adapted to normally occupy a neutral position, movement imparting means between said control member and clutch, a yieldable connection between said control member and said movement imparting means, said control member adapted to be moved from said neutral position in either direction to move said clutch into either of its operative positions, and means adapted to automatically return said clutch and control member to neutral position upon the limit of the chuck jaw movement being reached.

17. In a chucking device, a work table, chuck jaws carried thereby, power driven means operable in forward and reverse directions to open and close said chuck jaws, a clutch adapted to be moved in one or the other directions to connect said power driven means to operate in forward and reverse directions, and means for manually operating said clutch member comprising a manually controlled member adapted to normally occupy a neutral position, movement imparting means between said control member and said clutch, a yieldable connection between said control member and said movement imparting means, said control member adapted

to be moved from said neutral position in either direction to move said clutch into either of its operative positions, yieldable means for retaining said control member and clutch in their neutral and operative positions, and means adapted to automatically return said clutch and control member to neutral position upon the limit of the chuck jaw movement being reached.

18. In a chucking device, a work table, chuck jaws carried thereby, power driven means operable in forward and reverse directions to open and close said chuck jaws, a clutch adapted to be moved in one or the other directions to connect said power driven means to operate in forward or reverse directions, and means for manually operating said clutch member comprising a manually controlled member adapted to normally occupy a neutral position, movement imparting means between said control member and said clutch member, a spring controlled yieldable connection between said control member and said movement imparting means, said control member adapted to be moved from said neutral position in either direction to move said clutch into either of its operative positions, spring controlled yieldable means for retaining said control member and clutch in their neutral and moved positions, said means being of greater yieldability than said first mentioned spring controlled yieldable means, and means adapted to automatically return said clutch and control member to neutral position upon the limit of the chuck jaw movement being reached.

19. In a chucking device, a work table, chuck jaws carried thereby, power driven means operable in forward and reverse directions to open and close said chuck jaws, a clutch adapted to be moved in one or the other directions to connect said power driven means to operate in forward or reverse directions, and means for manually operating said clutch member comprising a manually controlled member adapted to normally occupy a neutral position, movement imparting means between said control member and said clutch member, an adjustable yieldable connection between said control member and said movement imparting means, said control member adapted to be moved from said neutral position in either direction to move said clutch into either of its operative positions, adjustable yieldable means for retaining said control member and clutch in their neutral and moved positions, said means being of greater yieldability than said first mentioned yieldable means, and means adapted to automatically return said clutch and control member to neutral position upon the limit of the chuck jaw movement being reached.

20. In a chucking device, a work table, chuck jaws carried thereby, power driven means coaxial with said work table operable in forward and reverse directions to open and close said chuck jaws, a clutch adapted to be moved in one or the other directions to connect said power driven means to operate in forward or reverse directions, and means for manually operating said clutch comprising a manually controlled member adapted to normally occupy a neutral position, a lever for moving said clutch, and a vertically reciprocating rod extending between said control member and said lever, said control member adapted to be moved from neutral position in either direction to move said clutch into either of its operative positions.

21. In a chucking device, a work table, chuck jaws carried thereby, power driven means operable in forward and reverse directions to open and close said chuck jaws, a clutch adapted to be moved in one or the other directions to connect said power driven means to operate in forward or reverse directions, and means for manually operating said clutch comprising a manually controlled member, a V-shaped yieldable detent for yieldably retaining said member in its normal neutral position, movement imparting means between said control member and clutch, said control member adapted to be moved from said neutral position in either direction to move said clutch into either of its operative positions.

22. In a chucking device, a work table, chuck jaws carried thereby, power driven means operable in forward and reverse directions to open and close said chuck jaws, a clutch adapted to be moved in one or the other directions to connect said power driven means to operate in forward or reverse directions, and means for manually operating said clutch comprising a manually controlled member, movement imparting means between said control member and clutch, said control member adapted to be moved from its normal neutral position in either direction to move said clutch into either of its operative positions, and a yieldable detent having cam surfaces adapted to move said movement imparting means to neutral or operative positions with a quick snap movement after a preliminary applied movement.

23. In a chucking device, a work table, chuck jaws carried thereby, power driven means operable in forward and reverse directions to open and close said chuck jaws, a clutch adapted to be moved in one or the other directions to connect said power driven means to operate in forward and reverse directions, and means for manually operating said clutch comprising a manually controlled member adapted to normally occupy a neutral position, movement imparting

means between said control member and clutch, said control member adapted to be moved from said neutral position in either direction to move said clutch into either of its operative positions, and means adapted to automatically return said clutch and control member to neutral position upon the limit of the chuck jaw movement being reached, and movement retarding means acting on said clutch and control member to limit their return movement to neutral position.

24. In a chucking device, a work table, chuck jaws carried thereby, power driven means operable in forward and reverse directions to open and close said chuck jaws, a clutch adapted to be moved in one or the other directions to connect said power driven means to operate in forward and reverse directions, and means for manually operating said clutch comprising a manually controlled member adapted to normally occupy a neutral position, movement imparting means between said control member and clutch, a yieldable connection between said control member and said movement imparting means, said control member adapted to be moved from said neutral position in either direction to move said clutch into either of its operative positions, means adapted to automatically return said clutch and control member to neutral position upon the limit of the chuck jaw movement being reached, and movement retarding means acting on said clutch and movement imparting means to limit their return movement to neutral position.

25. In a chucking device, a work table, chuck jaws carried thereby, power driven means operable in forward and reverse directions to open and close said chuck jaws, a clutch adapted to be moved in one or the other directions to connect said power driven means to operate in forward and reverse directions, and means for manually operating said clutch member comprising a manually controlled member adapted to normally occupy a neutral position, movement imparting means between said control member and clutch, said control member adapted to be moved from said neutral position in either direction to move said clutch into either of its operative positions, yieldable means for retaining said control member and clutch in their neutral and operative positions, means adapted to automatically return said clutch and control member to neutral position upon the limit of the chuck jaw movement being reached, and movement retarding means acting on said clutch and control member to limit their return movement to neutral position.

26. In a chucking device, a work table, chuck jaws carried thereby, power driven means operable in forward and reverse directions to open and close said chuck jaws, a clutch adapted to be moved in one or the other directions to connect said power driven means to operate in forward and reverse directions, and means for manually operating said clutch comprising a manually controlled member adapted to normally occupy a neutral position, a lever for moving said clutch, and a vertically reciprocating rod extending between said control member and said lever, said control member adapted to be moved from neutral position in either direction to move said clutch into either of its operative positions, means adapted to automatically return said clutch and rod to neutral position upon the limit of the chuck jaw movement being reached, and a dashpot acting upon said rod to limit its return movement to neutral position.

Signed at Bridgeport, in the county of Fairfield and State of Connecticut this sixth day of February A. D. 1925.

EDWARD P. BULLARD, JR.