No. 687,096. Patented Nov. 19, 1901.

T. WIEDEMANN.

AUTOMATIC DRILLING AND TAPPING CHUCK.

(Application filed Nov. 10, 1900.)

(No Model.)

fig. 1.

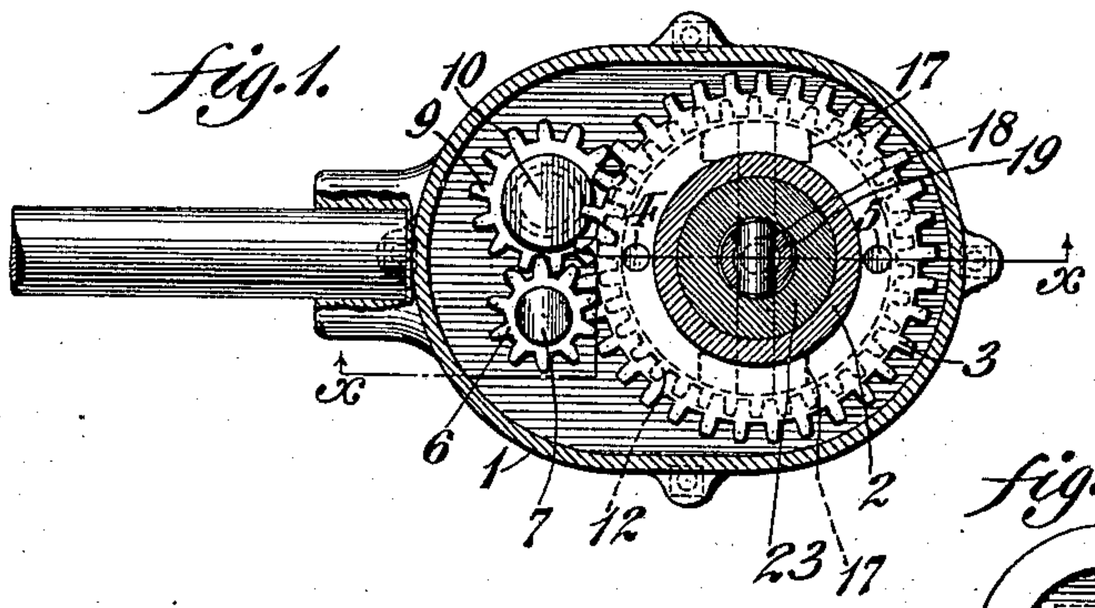


fig. 4.

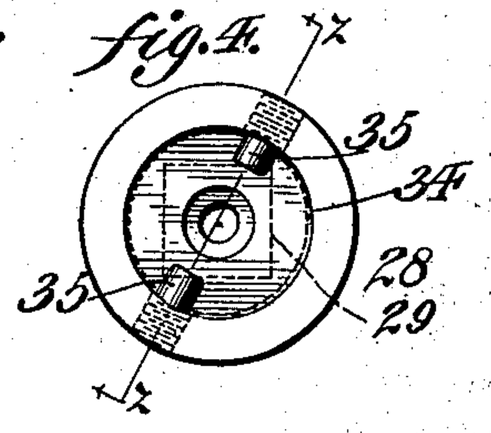


fig. 3.

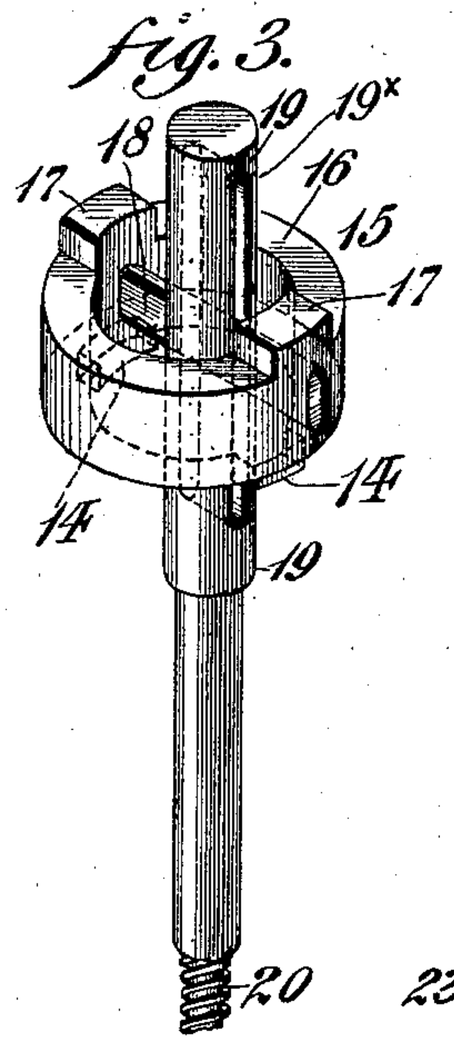


fig. 2.

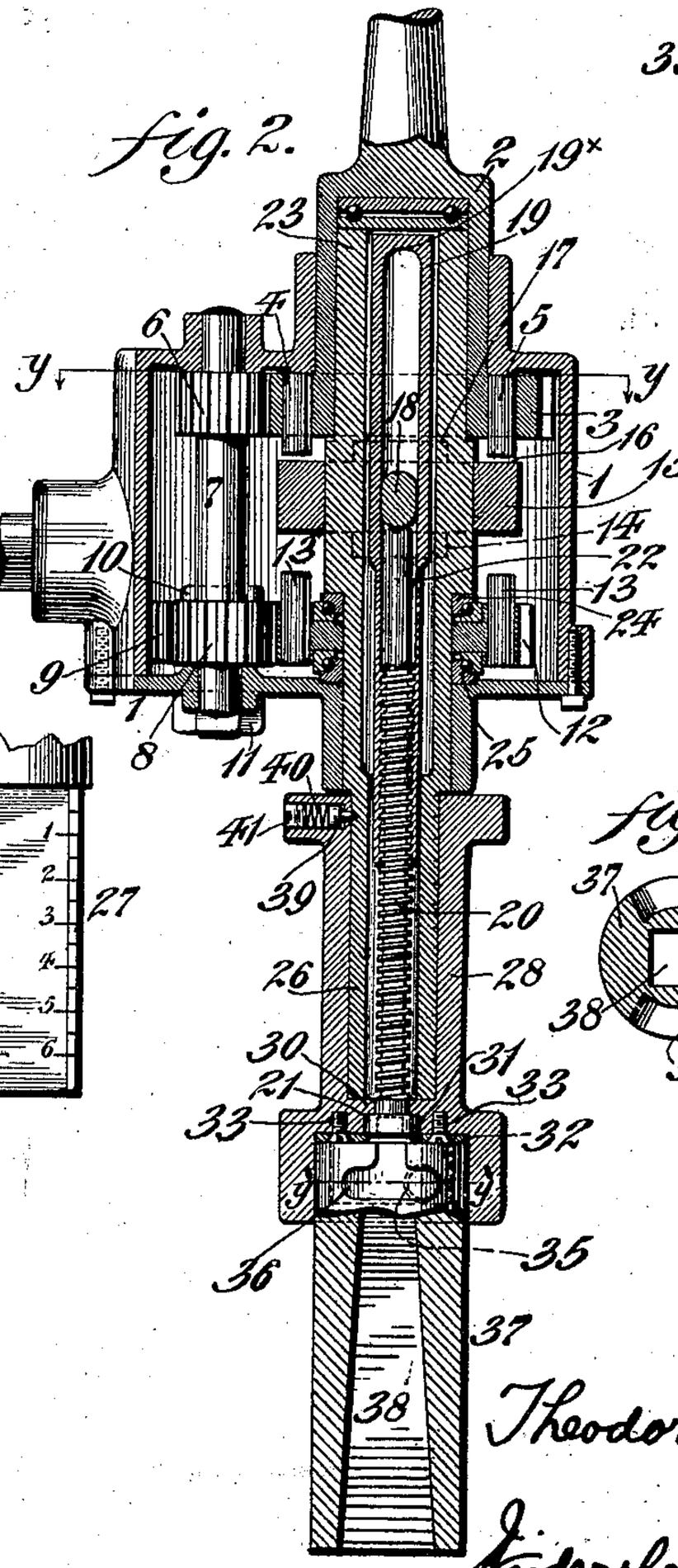


fig. 5.

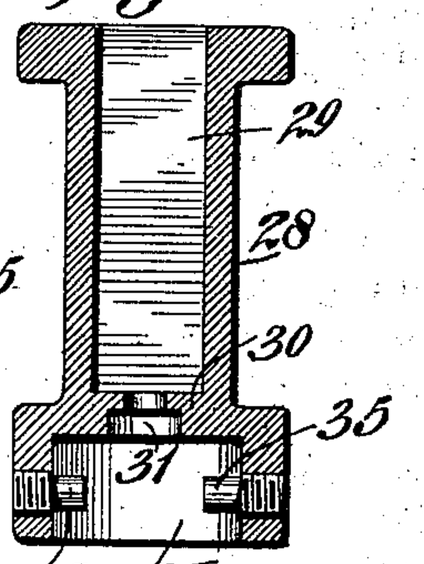


fig. 8.

fig. 6.

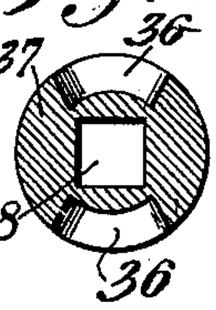
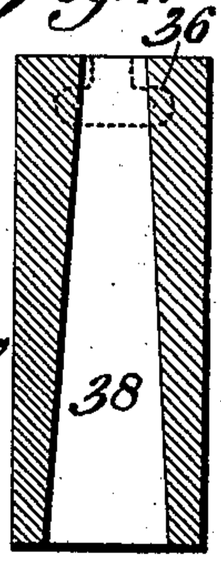


fig. 7.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC DRILLING AND TAPPING CHUCK.

SPECIFICATION forming part of Letters Patent No. 687,096, dated November 19, 1901.

Application filed November 10, 1900. Serial No. 36,035. (No model.)

To all whom it may concern:

Be it known that I, THEODORE WIEDEMANN, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Automatic Drilling and Tapping Chucks, of which the following is a specification.

My invention consists of an improved construction of an automatic drilling and tapping chuck wherein provision is made for automatically reversing the device and for utilizing the invention for drilling as well as tapping, and means are further provided for removing and replacing the lower or tool-holding chuck without necessitating the stopping of the machine.

It further consists of novel means for enabling the device when used for tapping to be automatically reversed according to requirements.

It further consists of novel details of construction, all as will be hereinafter fully set forth, and particularly pointed out in the claims.

Figure 1 represents a horizontal sectional view of an automatic drilling and tapping chuck embodying my invention, the section being taken on line *y y*, Fig. 2. Fig. 2 represents a vertical sectional view of Fig. 1, the section being taken on line *x x*, Fig. 1. Fig. 3 represents a perspective view of the carrier, carrier-pin, slotted nut, regulating-screw, and its adjuncts in detached position. Fig. 4 represents a bottom plan view of the intermediate chuck seen in Fig. 2 in detached position. Fig. 5 represents a section on line *z z*, Fig. 4. Fig. 6 represents a horizontal section on line *y' y'*, Fig. 2. Fig. 7 represents a vertical sectional view of the lower or tool-holding chuck seen in the lower portion of Fig. 2 in detached position. Fig. 8 represents a side elevation showing the graduated scale on the lower extension of the main spindle or shaft.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates the casing in which the driving and reversing mechanism is inclosed.

2 designates a driving-spindle, which may be connected with a drill-press, boring-mill, or any other suitable source of motive power, (not shown,) said driving-spindle terminating at its lower portion in the gear 3, from which latter depend the clutch-pins 4 and 5.

6 designates a pinion or idler which is in mesh with the gear 3 and is suitably mounted within the casing 1 upon the shaft 7, the upper and lower extremities of the latter having suitable bearings in the upper and lower portion of said casing.

8 designates an idler mounted on the lower portion of the shaft 7 and in mesh with the idler 9, which latter is suitably mounted on the stud 10, it being understood that the idler 8 is of less diameter than the idler 9.

11 designates a nut mounted on the stud 10 and adapted to secure the same in proper position. The idler 9 is in mesh with the reversing-gear 12, which latter is shown in dotted lines in Fig. 1 and in the lower portion of the casing seen in Fig. 2, said reversing-gear 12 being of lesser diameter than the gear 3.

13 designates clutch-pins which project upwardly from the reversing-gear 12 and are adapted to contact at the proper intervals, as will be hereinafter explained, with the extensions 14, which are two in number in the present instance, and depend from the under side of the carrier 15, the latter, as will be understood from Figs. 2 and 3, being composed of a ring 16, having projecting from the top or upper surface thereof the extensions 17, which are adapted to coact with the clutch-pins 4 and 5 at the proper intervals, as will be explained.

18 designates the carrier-pin, which extends transversely of the ring 16, composing the carrier, and passes through the slotted nut 19, the lower portion of the latter being internally threaded and adapted to engage the threaded portion of the regulating-screw 20, which latter has on its lower extremity the head 21, it being noted that the upper portion 22 of said regulating-screw is unthreaded and adapted to contact with the carrier-pin 18 at the proper intervals.

23 designates the main spindle or shaft, which is located within the driving-spindle 2 and extends downwardly through the carrier

15 and is adapted to inclose the nut 19 and its adjuncts, said main spindle being provided with the ball-bearing devices 24 and 25. The lower portion 26 of the main spindle 23 is squared and provided with a scale for the graduations 27, as will be best understood from Fig. 8, so that the relative position of the chuck 28 to said spindle may be readily ascertained, said chuck 28 having the squared opening 29 therein, into which the squared extension 26 is adapted to be inserted, so that said chuck 28 is capable of longitudinal movement relative to the lower extension of the main spindle 3. The intermediate chuck 28 has a partition 30 in its lower portion, through which passes the lower end of the regulating-screw 20, the under side of said partition being provided with a recess 31, which receives the head 21 on the lower extremity of said regulating-screw, said head being held in position by means of the plate 32 and the screws or similar fastening devices 33.

34 designates a recess in the lower portion of the intermediate chuck 28, which is provided on its inner periphery with the carrier-pins 35, which project toward each other and are adapted to engage the walls of the T-shaped recesses 36, which are located in the upper outer portions of the lower or tapping or drilling chuck 37, the latter being provided with a socket 38 for the reception of the shank of the tap, drill, or other tool which is employed.

39 designates a plunger which is seated in a recess in the upper portion of the chuck 28 and is adapted to retain said chuck in its uppermost position, said plunger being retained in place by means of the spring 40, which is held in position by the plug or closure 41.

It will be first understood that the tool can only be operated in a vertical position with the driving-spindle at the upper side and the tapping-chuck at the bottom side.

The operation is as follows: When the parts are in the position shown in Fig. 2, assuming that a tap is inserted in the lower chuck 37, the device is about to tap an opening. It is understood that the spindle 2 is rotated to the right, and consequently the pins 4 and 5, carried by the gear 3, engage the extensions 17 of the carrier 15 and turn the main spindle 23 also to the right, it being understood that the idlers 6, 8, and 9, as well as the reversing-gear 13, turn free. As the tap advances in the work, it being understood that there is sufficient friction between the pins 4 and 5 and the extensions 17 to hold these parts in eagagement, the chucks 37 and 28 advance with the tap, the chuck 28 sliding upon the square portion of the main spindle, while the regulating-screw, which moves with said chuck 28, draws the nut 19 downwardly with it until the upper wall $19^{\times}$ of the slot in said nut 19 contacts with the pin 18, whereupon a further advance of the tap and parts connected therewith will cause said nut 19 to draw the carrier 15 downwardly to disengage the clutch-pins 4 and 5 and the extensions 17. This will throw the extensions 14 on the lower end of the carrier 15 into engagement with the clutch-pins 13, and since the reversing-gear 12 is rotating to the left in consequence of the train of gearing between it and the gear 3 the tap and related parts are turned to the left to withdraw said tap from the work. The upward movement of the tap continues until its threads are disengaged from the threads of the opening; but this does not remove the lower end of the tap clear of the work, so that the latter can be shifted, as said tap will continue to rotate to the left, but with its threads disengaged from the threads of the opening, until the chuck 28 is lifted, so that the plunger 39 can engage the recess in the square portion 26 of the spindle. The operator does this by lifting the chuck 28, and when this plunger 39 engages said recess the carrier 15 stands intermediate the clutch-pins 4 and 5 and 13, the extent to which the chuck 28 and parts connected therewith are lifted being sufficient to raise the lower end of the tap above the upper surface of the work. The work can then be shifted to bring a new opening in position to be tapped, and when it is desired to again start the tool the parts are again lifted by means of the chuck 28 to bring the carrier 15 to the position shown in Fig. 2, whereupon the operation above described is repeated.

It is understood that the spindle 23 is rotated by reason of the engagement of the pin 18 of the carrier, which passes through slots in the sides of said spindle coincident with the slots in the nut 19.

It is understood that by turning the regulating-screw in the manner described the nut 19 can be shifted so as to regulate the extent to which the slot therein extends above the pin 18, and thus regulate the distance the tap will advance before the carrier is disengaged from the gear 3 by reason of the engagement between the pin 18 and the upper wall $19^{\times}$ of said slot. By reason of the square or polygonal shape of the contact-surface of the extension 26 and the opening 29 it will be seen that by means of the graduated scale 27 on said squared extension the intermediate chuck 28 can be set to run a tap to any desired depth.

The head 21 of the screw 20 is provided with a square or polygonal opening or socket, as indicated in dotted lines in Fig. 2, for the insertion of a suitable wrench, whereby said screw may be adjusted according to the scale 27, and as said screw, its head 21, and plate 32 are fastened to the chuck 28 the scale can be readily read above the upper extremity of the chuck 28.

By the employment of the T-shaped slot or recess 36 in the lower chuck 37 it will be apparent that I can quickly bring the chuck into position or interchange the tapping-chuck and the drilling-chuck, to which latter feature I desire to call special attention, since my in-

vention can be used for drilling as well as tapping, as will be apparent to those skilled in the art, and the lower chuck 37 can be removed and replaced without necessitating stoppage of the machine.

It will be apparent that changes may be made by those skilled in the art which will come within the scope of my invention, and I do not therefore desire to be limited in every instance to the exact construction I have herein shown and described.

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

1. In an automatic drilling and tapping chuck, a casing, a driving-spindle, a gear carried thereby, a reversing-gear, gearing interposed between said gears, the main spindle having a scale, a reciprocatory carrier around said main spindle for rotating the latter, a regulating-screw and a chuck connected with said regulating-screw.

2. In an automatic drilling and tapping chuck, a main spindle having a squared extension at the lower portion thereof, means for effecting the rotation of said main spindle, and a chuck carried by said extension, the extension having a scale thereon.

3. In an automatic drilling and tapping chuck, a main spindle, means for rotating the same, means for automatically effecting the rotation thereof in a reverse direction, an intermediate chuck carried upon an extension of said main spindle, a regulating-screw engaged with said chuck and with the reciprotatory carrier of said reversing means and a lower or tool-holding chuck adapted to be carried by said intermediate chuck.

4. In an automatic drilling and tapping chuck, a casing, a driving-spindle located therein and having a gear on its upper portion, a reversing-gear located within said casing, gearing intermediate said gears, clutch-pins projecting from each of said gears toward each other, a carrier located intermediately of said clutch-pins, a chuck for holding a tap or drill and means embodying a regulating-screw connected with the chuck and a pin movable with the carrier and resting on said screw for imparting rotation from said carrier to said chuck, said pin being movable independent of the spindle.

5. In an automatic drilling and tapping chuck, a main spindle, means for rotating said main spindle, means for automatically effecting the reversing thereof, a squared extension on the lower portion of said main spindle and a chuck carried on said extension, the latter having a scale or graduations thereon.

6. In an automatic drilling and tapping chuck, a chuck, means for rotating the same, means for automatically reversing the rotation of said chuck, a recess in the lower portion of said chuck, pins projecting diametrically toward each other in said recess and a lower or tool-holding chuck, the latter being provided on its opposite portions with a T-shaped recess adapted to be engaged by said pins.

7. In an automatic drilling and tapping chuck, a casing, a driving-spindle, a gear carried thereby, a reversing-gear, gearing intermediate said gears, clutch-pins projecting from said gears toward each other, a carrier having extensions on the top and bottom thereof, a carrier-pin extending transversely thereof, a slotted nut, a regulating-screw engaging the lower portion thereof, a main spindle inclosing said nut and regulating-screw, an intermediate chuck rotated by said main spindle and rotatably mounted on the said screw and a tool-chuck rotated by said intermediate chuck.

8. In an automatic drilling and tapping chuck, a casing, a driving-spindle having a gear thereon, a reversing-gear located within said casing, gearing intermediate said gears, clutch-pins projecting toward each other from said gears, a carrier located intermediately of said gears and provided with extensions on its upper and lower surface adapted to coact with said clutch-pins, a main spindle, a slotted nut contained within said main spindle, a carrier-pin extending transversely on said carrier and passing through said nut and main spindle, a regulating-screw located in the lower portion of said nut, a squared extension on the lower portion of said main spindle, an intermediate chuck carried upon said extension and a lower tool-holding chuck carried by said intermediate chuck.

9. In an automatic drilling and tapping chuck, a main spindle, means for rotating the same, means for automatically reversing the direction of rotation of said main spindle, an intermediate chuck adjustable on the main spindle, and a chuck carried by the latter and adapted to rotate a suitable tool, and means for positively driving said intermediate chuck.

10. In an automatic drilling and tapping chuck, a main spindle, means for rotating the same, means for automatically reversing the direction of rotation of said main spindle, and a chuck carried by the latter and adapted to rotate a suitable tool, in combination with a scale located in an extension of said main spindle, and an intermediate chuck adjustable relatively to said scale.

11. In an automatic drilling and tapping chuck, a casing, a driving-spindle located therein and carrying a gear, a reversing-gear in said casing, means for actuating said gears, a tool-holding chuck indirectly carried by said spindle, and means intermediate said gears for actuating said chuck, an intermediate chuck and means for its adjustment to adapt it to run a tap of predetermined depth.

12. In an automatic drilling and tapping chuck, a casing, a driving-spindle located therein and carrying a gear, a reversing-gear in said casing, means for actuating said gears, a tool-holding chuck indirectly carried by said spindle, and means independent of and

intermediate said gears for actuating said chuck, in combination with other mechanism intermediate said gears for automatically reversing the direction of rotation of said chuck, an intermediate chuck and a scale coöperating therewith.

13. In an automatic drilling and tapping chuck, an intermediate chuck, means for rotating the same, a scale located in proximity to said chuck, and means for adjusting said chuck with respect to said scale.

14. In an automatic drilling and tapping chuck, an intermediate chuck, means for rotating the same, a scale located in proximity to said chuck, and means for adjusting said chuck with respect to said scale, in combination with a tool-holding chuck having recesses therein and pins carried by said intermediate chuck and adapted to engage said recesses.

15. In an automatic drilling and tapping chuck, an intermediate chuck, means for rotating the latter, a tool-holding chuck, T-shaped recesses in the latter and pins carried by said intermediate chuck and adapted to engage said recesses.

16. In an automatic drilling and tapping chuck, a main spindle, means for rotating said main spindle, means for automatically effecting the reversing thereof, an extension on said main spindle, a chuck carried on said extension, the extension having a scale thereon, and means for adjusting said chuck relative to said scale.

17. In an automatic drilling and tapping chuck, a driving-spindle located therein and carrying a gear, a reversing-gear in said casing, means for actuating said gears, pins projecting from said gears and a regulating-screw, a slotted nut carried thereby, a pin working in the slot of the nut, and a carrier movable with said pin and having means actuated by said pin for rotating a tap or drill.

18. In an automatic drilling and tapping chuck, a driving-spindle located therein and carrying a gear, a reversing-gear in said casing, means for actuating said gears, pins projecting from said gears and a regulating-screw, a slotted nut movable therewith, a pin working in the slot of the nut, and a carrier movable with said pin and having means actuated by said pins for rotating a tap or drill and for also automatically effecting the reversing thereof.

19. In an automatic drilling and tapping chuck, a main spindle, a driving-spindle, located therein, a carrier within said casing, means for rotating said carrier in either direction, a chuck, an intermediate chuck connected with said chuck and slidable on an extension of the main spindle and power-transmission devices intermediate said intermediate chuck and carrier.

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