(No Model.) 3 Sheets—Sheet 1.

J. T. COWLEY.

APPARATUS FOR DRILLING.

No. 431,107. Patented July 1, 1890.

Fig. 1.

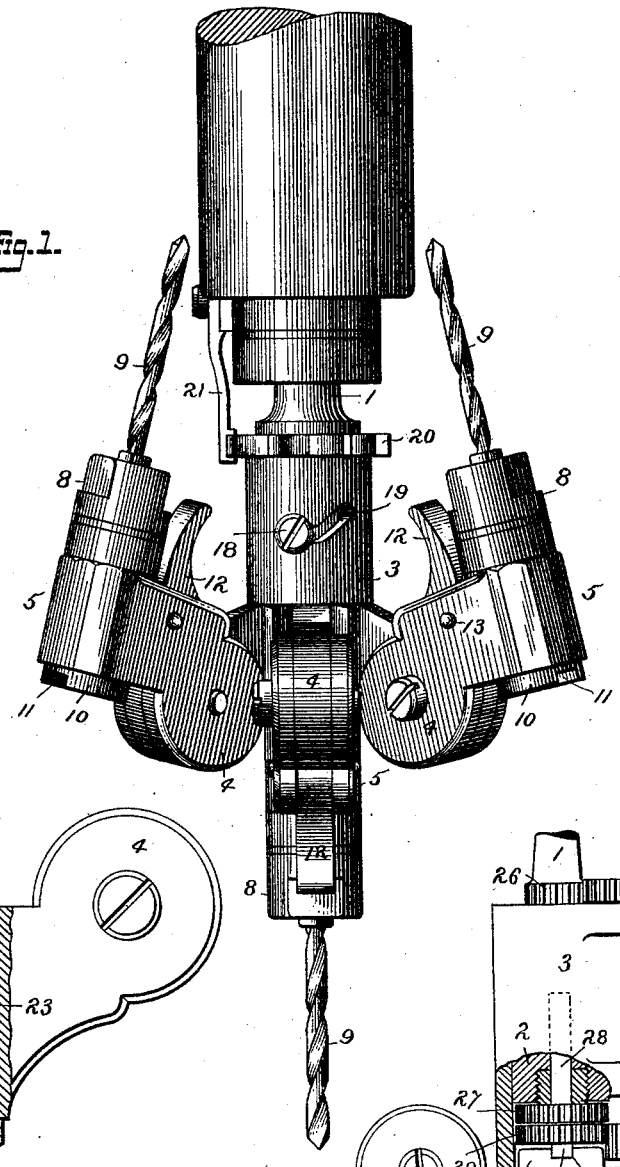


Fig. 5.

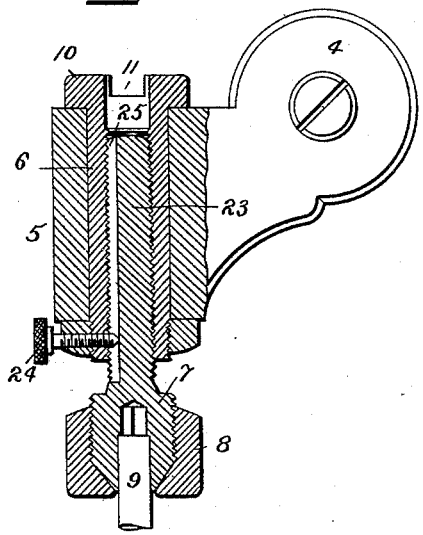
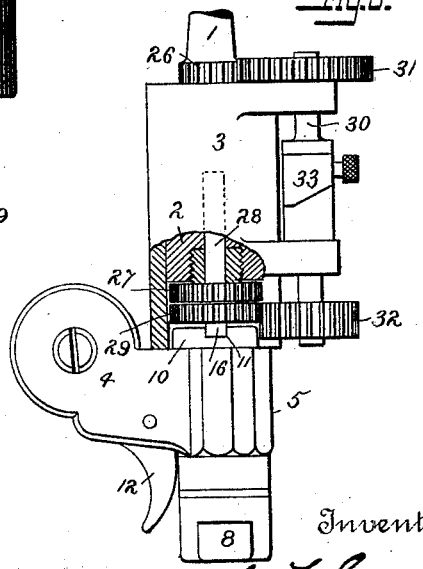


Fig. 6.



Witnesses
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3 Sheets—Sheet 2.

(No Model.)

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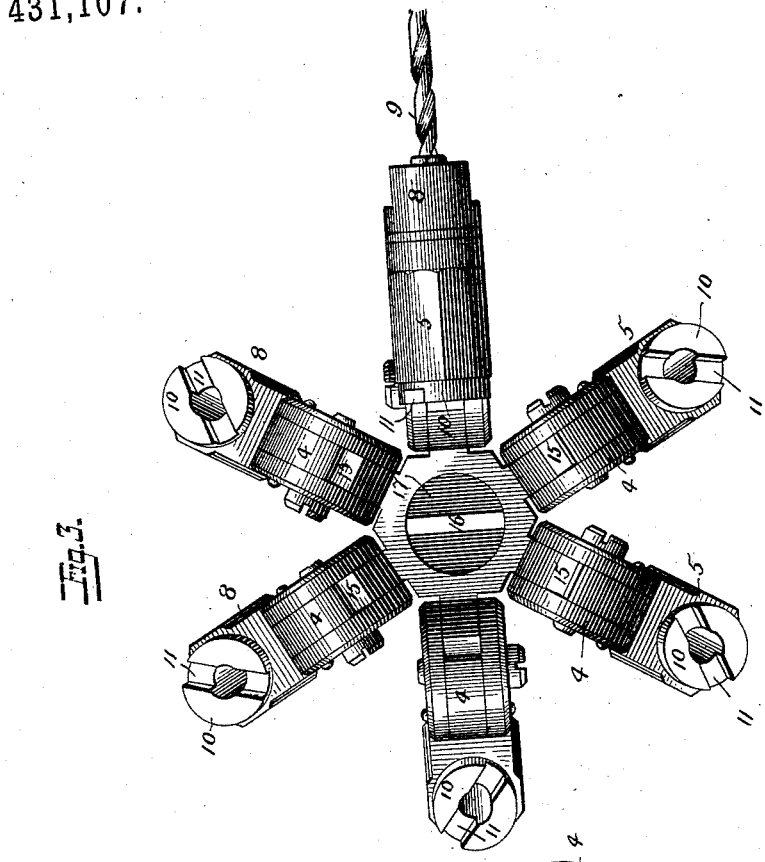

Fig. 3.

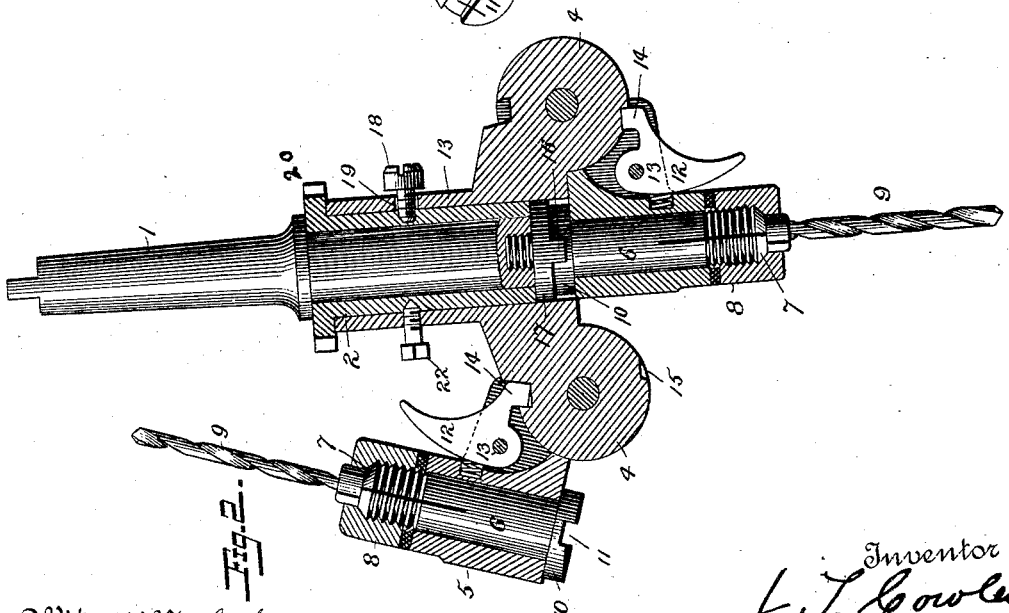

Fig. 2.

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APPARATUS FOR DRILLING.

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Fig. 4.

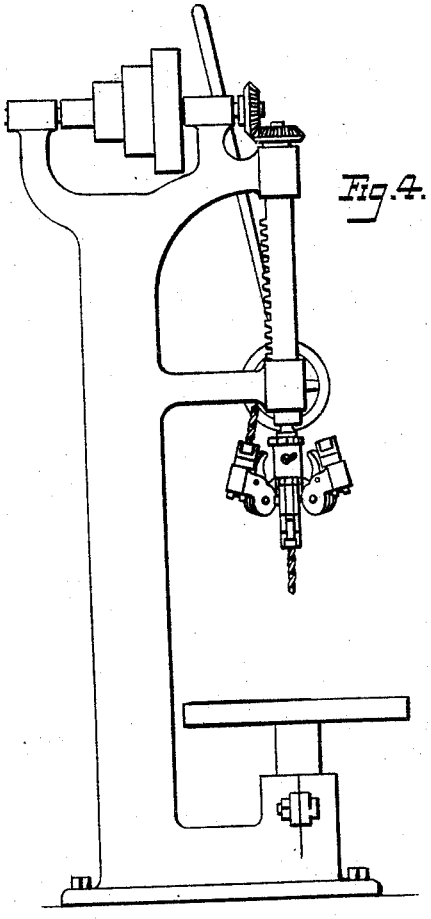


Fig. 7.

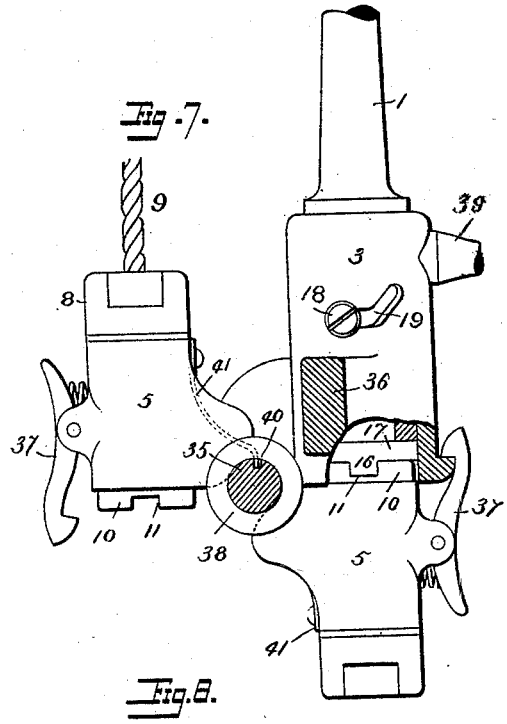
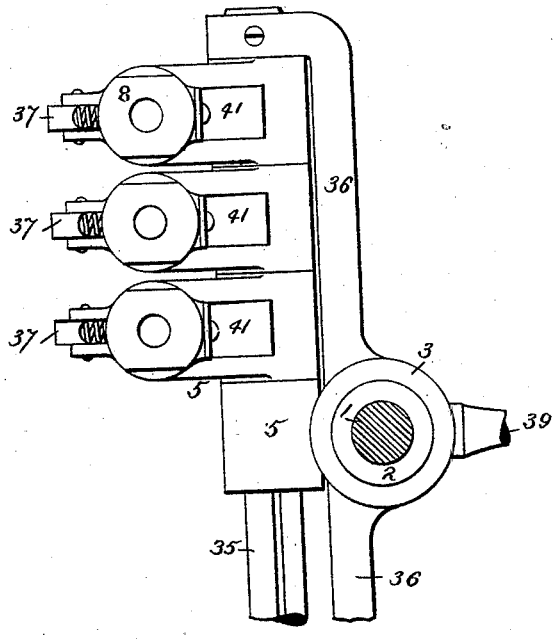


Fig. 8.



Witnesses:
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UNITED STATES PATENT OFFICE.

JAMES. T. COWLEY, OF LOWELL, MASSACHUSETTS.

APPARATUS FOR DRILLING.

SPECIFICATION forming part of Letters Patent No. 431,107, dated July 1, 1890.

Application filed December 2, 1889. Serial No. 332,235. (No model.)

To all whom it may concern:

Be it known that I, JAMES T. COWLEY, a citizen of the United States, residing at Lowell, county of Middlesex, State of Massachusetts, have invented certain new and useful Improvements in Drilling Apparatus, of which the following is a specification.

My invention relates to drill-press and tapping-machine attachments, and has for its object to provide means whereby a series of tools may be readily brought into operative relation in the press or machine in succession or any desired order, whereby the article to be operated upon need be adjusted but once, and so that perfect registration of the work can be readily accomplished; and to these ends it consists in an attachment constructed, arranged, and operating substantially as hereinafter set forth.

Referring to the accompanying drawings, Figure 1 is a side view showing one form of my attachment in operative condition. Fig. 2 is a vertical section of the same. Fig. 3 is a bottom plan view showing one of the spindles extended. Fig. 4 is a general view of a bench-drill press, showing my attachment connected therewith. Fig. 5 is an enlarged detail view, partially in section, showing the means for adjusting the spindle. Fig. 6 shows a means of varying the speed of the spindles. Fig. 7 is a side view, partially in section, showing a modified form of my device. Fig. 8 is a plan view of the same.

In the construction of machinery and in other mechanical operations it is often desirable and necessary to operate upon a single part or piece successively with different tools, and it is desirable to be able to do this rapidly and accurately without the necessity of adjusting the part operated upon for each operation. In order that this may be done, I have constructed an attachment which is adapted to be applied to many and various machines already in use, and by means of which a series of operations may be performed quickly and accurately, and while my invention may be embodied in various forms I have shown herein what I consider to be some of the most convenient and successful adaptations of my invention.

In Fig. 4 I have illustrated an ordinary bench-drill press, the operation of which will be readily understood by those skilled in the art, and have shown my attachment in its normal position ready for operation, and in the other figures I have illustrated upon a larger scale more particularly the details of construction.

The main spindle 1 is adapted to be attached to the head-piece of the drill-press, tapping-machine, lathe, or other similar machine, and to receive its motion therefrom. Loosely mounted upon this spindle is a cylinder or sleeve 2, and loosely mounted upon this cylinder is the outer end cylinder or head-piece 3. In the construction shown in Figs. 1, 2, and 3, especially, this head-piece is provided with a polygonal-shaped body having extensions 4 projecting laterally from each side. Pivotally mounted on each of these is a socket or holder 5, each carrying a special spindle 6, one end 7 of which is in the form of a clutch or clamp adapted to be controlled by a nut 8, and to hold and secure the tool 9 in the spindle. The opposite end of this spindle is formed with a projecting head 10, having a transverse central slot 11. All of the spindles are constructed substantially alike and are adapted to carry different tools. Each socket or holder 5 is provided with some means of holding it in its normal raised position, as shown in the figures referred to, and in this instance I have shown a thumb-catch 12, which is pivoted to the socket and pressed by a spring 13, so as normally to engage a recess 14 in the extension 4 of the head, so that the sockets and their contained tools are maintained in their elevated position out of the way when not in use. When, however, it is desired to use any one of the numerous tools, the thumb-catch 12 is released and a holder turned down in position shown, so that the spindle 6 is brought in alignment with the main spindle 1, and the thumb-nut 12 engages with the notch 15 in the extension to hold the socket in this position. The lower portion of the main spindle is provided with a rib or flange 16, which is adapted to engage a recess 11 in the special spindles. This rib or flange may be made integral with the main spindle, or, as shown in Fig. 1, the spindle may be provided with a head-piece 17, adapted to be connected to the end of the main spindle by a screw or

otherwise, and having the rib or projection 16 on its opposite side.

The cylinder 2 is provided with a screw or pin 18, passing through a cam-slot 19 in the outer cylinder 3, so that the latter cylinder will move upward and downward with relation to the inner cylinder, according to the position of the slot. It will thus be seen that when the outer cylinder is turned to the left, so that the screw, as seen in Fig. 1, will occupy the opposite extremity of the slot, the outer cylinder, with its head and appurtenances, will be lowered below the inner cylinder, and consequently below the rib or projection 16 on the end of the cylinder. When, however, the cylinder is turned so that the pin occupies the position shown in Fig. 1, the outer cylinder, with its head and appurtenances, is raised so as to bring the rib or flange 16 into engagement with the slot 11 of the lower spindle, and thereby form a positive clutch engagement between the two spindles. In order that the rib or flange will positively engage with the slot, I preferably make the portions of the side of the slot where the power is more forcibly applied slightly elongated, as shown in Figs. 2 and 3, and this aids in insuring the seating of the two parts of the clutch. The upper part of the inner cylinder 2 is provided with a ratchet 20, and a spring 21, or other suitable device secured to the sliding head of the drill—for instance, as shown in Fig. 1—engages with said ratchet and permits the rotation of the cylinder or head in a direction opposite to the rotation of the spindle to bring the holders into the desired position. It will thus be seen that the main spindle 1 is connected to any one of the other spindles 6 by means of the clutch, and of course the tool is operated in accordance with the rotation of the spindle, while the head carrying the other spindles remains at rest. When, however, it is desired to bring into operation any one of the other tools, the outer cylinder, with its head, is turned so as to bring the pin or screw 18 into the upper end of the slot, which acts to lower the socket or holder 5, so that the clutch is separated. The holder 5 is then swung out of operative position into its normal elevated position, and the holder carrying the desired tool swung into line with the main spindle. The holder 3 is then turned so as to lift the head and cause the clutch to engage with the spindle carrying the tool. As the tool is always in the same relative position to the main spindle, it is evident that no adjustment of the article operated upon is necessary through a succession of operations.

In Fig. 5 I have illustrated a means for adjusting the drills or taps at different heights in the sockets or holders. In this case the spindle 6 is made hollow and preferably screw-threaded, and a clutch 7 8, carrying the tool 9, is provided with an extension 23, just fitting said spindle. I have shown this extension screwed into the opening in the spindle and secured in position by a set-nut 24, the inner end of which fits in a slot 25 in the extension. In this way it will be seen that the tool may be adjusted to any desired height within the distance of one screw-thread, and, if desired, other slots 25 may be made in the extension, so that a finer adjustment may be obtained.

In Fig. 6 I have illustrated one form of back-gearing which I am using to reduce the speed of the tool-holding spindles for large drills and the like. In this case the main spindle 1 is provided with a gear 26 above the cylinder-head 3, and this head is recessed at its lower end to receive another gear 27. The head or plate 17, carrying the rib or flange 16, is provided with a projection 28, extending into the lower end of the main spindle, so that it can rotate independently thereof, and is provided also with a gear-wheel 29. Mounted in extensions of the main cylinder 3 is a shaft 30, having upon its upper end a gear-wheel 31, adapted to engage the gear 26 on the main spindle, and at its lower end a broad gear-wheel 32, adapted to engage one or both of the gears 27 29. Midway between these spindles is arranged a cam-sleeve 33, adapted to elevate the shaft 30 so as to bring the gear 31 out of engagement with the gear 26, and at the same time the gear-wheel 32 engages both the gears 27 29. In this connection the tool is at the normal speed of the main spindle. When, however, the shaft 30 is in the position shown in the figure, with the gear 31 engaging the gear 26 and the gear 32 engaging the gear 29, the tool and its spindle may be rotated more slowly than the main spindle.

In Figs. 7 and 8 I have illustrated a modified arrangement in which the sockets or holders 5 are mounted upon a rod 35, supported in arms 36, extending from the main cylinder or sleeve 3. These sockets are normally held in a lifted position by a spring 41, engaging a slot 40 in the rod, and when any particular tool is to be used the socket is slid along the rod until it is opposite the main sleeve 3, when it is swung around in position to bring the spindle 6 into engagement with the clutch, and is secured in this position by a thumb-catch 37. These sockets may be made removable from the bar 35 by cutting out a portion 38, between the dotted lines, Fig. 7, so that one or a number of sockets can be readily applied to the rod 35 at pleasure. 39 represents a handle or arm projecting from the main cylinder 3, by means of which the attachment may be held in position manually, or the arm may be extended to bear against the frame of the machine in which the attachment is used, and this will prevent the head or cylinder 3 rotating with the spindles.

In these modifications it will be seen that the main cylinder or sleeve 3 slides upon a main spindle to engage and disengage the clutch with the special spindles in the holders or sockets, and it will be understood that in

any of the forms the adjusting devices shown in Fig. 5 or the speeding devices shown in Fig. 6, or equivalents thereof, may be applied to operate the tools.

It is evident from the above description that my invention is not confined to the precise constructions and arrangements shown herein, as they can be modified by those skilled in the art without departing from the essential feature of my invention. While I have shown what I consider to be the most effective and simple clutch device, it is evident that other clutches may be used; but I have found that illustrated to be certain in its operation as well as simple in its construction.

In some instances I do not provide an inner cylinder around the main spindle, but apply the outer cylinder or head directly thereon. There is then no provision for the sliding of the head to cause the engagement and disengagement of the clutch between the main and special spindles; but I have found that beveling of the sides of the engaging parts, as shown in Figs. 1 to 3, assists the engagement of the parts of the clutch as the special spindle is swung into position; or with the two cylinders a set-screw 22 may be used to hold them together and the special spindle may be swung into engagement. This is specially desirable when the attachment is used in connection with a tapping-machine and the rotation is reversed.

What I claim is—

1. The improved drill-head attachment having a series of independent spindles independently adjustable to bring each of said spindles into operative position, substantially as specified.

2. The improved drill-head attachment provided with a series of independent spindles adapted to carry independent tools and each adjustable into position to connect with the driving-spindle and also to a position out of line with said spindle, substantially as specified.

3. The improved drill-head attachment adapted to be mounted on a spindle and having a number of independent special spindles pivotally connected thereto and adapted to swing into alignment with the main spindle, substantially as described.

4. The improved drill-head attachment adapted to be mounted upon a spindle and having a number of independent special spindles mounted thereon, normally extending upward and adapted to be swung into alignment with the main spindle, substantially as described.

5. The improved drill-head attachment adapted to be mounted upon a main spindle and having a number of independent special spindles pivotally connected thereto, and locking devices for supporting the special spindles in lifted position, substantially as described.

6. The improved drill-head attachment adapted to be mounted upon a main spindle and having a number of sockets carrying special spindles pivotally connected thereto, the said special spindles being adapted to be brought into alignment with the main spindle, and locking devices for holding the sockets in position, substantially as described.

7. The improved drill-head attachment consisting of a cylinder or head adapted to be mounted upon the main spindle, a series of independent special spindles mounted on said head and adapted to be brought into alignment with the main spindle, and a clutch device connecting the main and special spindles when in position for operation, substantially as described.

8. The improved drill-head attachment consisting of a cylinder or head adapted to be mounted upon the main spindle, a number of independent spindles pivotally connected with the head and adapted to be brought into alignment with the main spindle, each special spindle having a recess in its end, and a rib or flange connected to the main spindle and adapted to engage with said recess, substantially as described.

9. The combination, with the main spindle having a projecting flange at its lower end, of a number of independent spindles adapted to be brought into alignment with the main spindle, each special spindle having a recess adapted to engage with the flange on the main spindle, substantially as described.

10. The combination, with the main spindle, of a sleeve loosely mounted thereon and a tool-carrying head mounted on the sleeve and adjustable thereon, substantially as described.

11. The combination, with the main spindle and a sleeve loosely mounted thereon having a pin projecting therefrom, of a tool-carrying head mounted on the sleeve and having a cam-slot engaging the pin, substantially as described.

12. The combination, with the main spindle having one portion of a clutch at its lower end, of a head mounted thereon, the said head carrying a number of independent special spindles each having a portion of a clutch adapted to engage with the clutch portion on the main spindle, substantially as described.

13. The combination, with the main spindle having a portion of a clutch, of a sleeve loosely mounted on the spindle, a sliding cylinder or head mounted on said sleeve, and a number of special spindles carried by said head and each provided with a portion of the clutch, whereby the clutch portion on any one of the special spindles may be brought into and out of engagement with the clutch portion on the main spindle, substantially as described.

14. The combination, with the main spindle, of a plate having a projecting rib secured to the lower end of the spindle, a sleeve mounted on said spindle, a main cylinder or head mounted on said sleeve, and a number of sockets pivotally connected to the head, each

provided with a special spindle having a recess in the end thereof, substantially as described.

15. The combination, with the main spindle, of a head loosely mounted thereon having a number of radially-arranged sockets, each carrying a special spindle adapted to be brought into alignment with the main spindle, substantially as described.

16. The combination, with the main spindle and a sleeve loosely mounted thereon, of a cylinder or head mounted on said sleeve, a cam-slot and pin for adjusting the sleeve and cylinder with relation to each other, a number of independent pivoted sockets mounted on said head, each carrying a special spindle and adapted to be brought into alignment with the main spindle, and a clutch controlled by the sliding cylinder, substantially as described.

17. The combination, with the sleeve, a main spindle rotating therein, and an arm attached to the sleeve, of a cylinder mounted on the spindle and carrying a number of independent special spindles adapted to engage with the main spindle, and a ratchet or cylinder engaging with said arm, whereby said cylinder is prevented from rotating with the spindles, substantially as described.

18. The improved drill-head attachment adapted to be mounted on a main spindle, having a series of independent special spindles mounted on said head, and a clutch for holding the tool adjustably mounted in the special spindle, substantially as described.

19. The improved tool-holding spindle provided with a clutch having an extension adjustably mounted in said spindle and a stop engaging a slot in said extension, substantially as described.

20. The combination, with a cylinder or head adapted to be mounted on a main spindle, of a number of special spindles pivotally connected to said head and adapted to be brought into alignment with said main spindle, and a reducing gear mounted on said head and arranged to connect the main and special spindles, substantially as described.

21. The combination, with the main spindle, of a head mounted thereon carrying a number of special spindles adapted to be brought into alignment with the main spindle, a shaft also mounted in the head, having gear-wheels at its opposite ends adapted to engage with gears upon the main spindle, and a clutch device loosely mounted in the main spindle, having a gear adapted to engage with one of said gears, substantially as described.

22. The combination, with the main spindle having two gears fixed thereon, a cylinder or head mounted on the spindle between the gears, a shaft mounted in said cylinder or head, having a gear at each end adapted to engage the gears on the spindle, with a cam for moving one or the other of said gears into operative connection with the gears on the spindle, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses,

JAMES T. COWLEY.

Witnesses:

WILLIAM HILTZ,

CLARENCE COREY.