No. 883,481. PATENTED MAR. 31, 1908.

G. T. REISS.

MULTIPLE DRILL.

APPLICATION FILED MAR. 4, 1907.

2 SHEETS—SHEET 1.

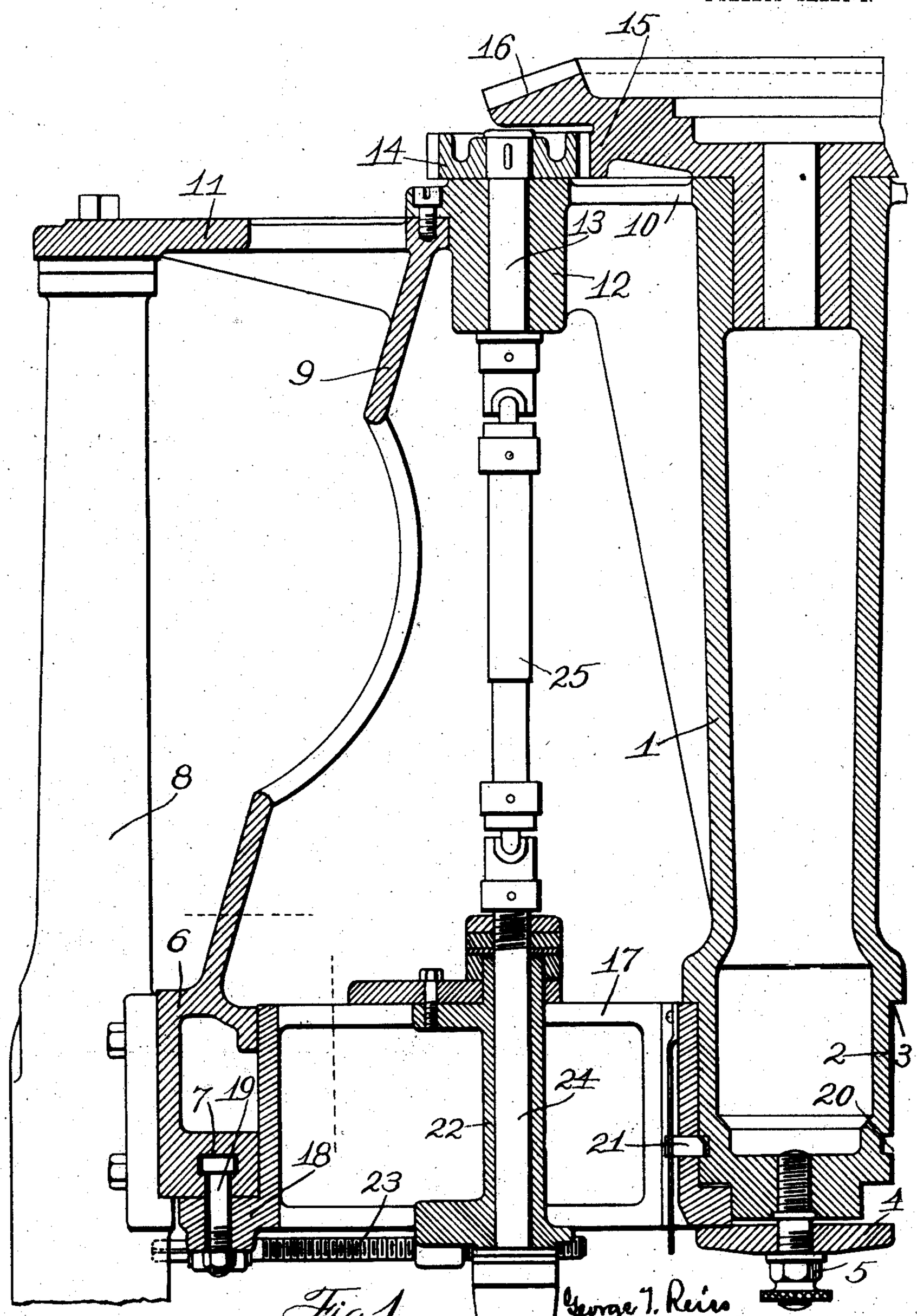

Fig. 1.

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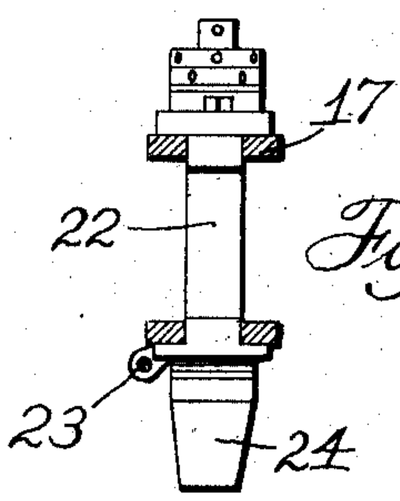

Fig. 3.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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MULTIPLE DRILL.

No. 883,481. Specification of Letters Patent. Patented March 31, 1908.

Application filed March 4, 1907. Serial No. 360,573.

To all whom it may concern:

Be it known that I, GEORGE T. REISS, a citizen of the United States, residing at Hamilton, Butler county, Ohio, have invented certain new and useful Improvements in Multiple Drills, of which the following is a specification.

This invention pertains to that class of multiple drills to be employed in drilling at one time a number of holes in a circle, the diameter of the circle and the number of holes therein being subject to variation.

My improvements relate to means for facilitating the arrangement of the drill spindles in desired relationship to each other in providing for variations in diameter of the circle in which they are arranged and variations in the number of spindles in the circular series.

My invention will be readily understood from the following description taken in connection with the accompanying drawings in which:—

Figure 1 is a vertical section of a multiple drilling machine exemplifying my invention: Fig. 2 a horizontal section of the same: and Fig. 3 a vertical transverse section, on a reduced scale, of one of the spindle-housings and its carrier.

In the drawings:—1, indicates a fixedly supported strong vertically disposed suspended stem: 2, a bearing at the foot of the stem: 3, a downwardly presenting shoulder on this bearing: 4, a clamping disk at the foot of the stem: 5, a screw engaging the disk and stem to serve in drawing the disk forcibly upward: 6, a large strong ring rigidly disposed concentric with and at substantially the level of the bearing at the foot of the stem: 7, an annular tee-slot formed in the lower face of this ring: 8, a column, of which there may be any desired number, this column having the ring bolted to it and serving as a support for the ring: 9, a frame-part extending rigidly upward from ring 6 to about the level of the top of the central stem, this frame-part taking, preferably, the form of a skeleton housing surrounding the stem: 10, a flange projecting outwardly from the top of the stem and rigidly secured to the top of housing 9: 11, a flange projecting outwardly from the top of housing 9 and rigidly bolted to the top of the column: 12, a vertical bearing rigidly supported by stem flange 10, there being as many of these bearings as are called for by the maximum number of holes in circular series to be provided for in the machine, the series of bearings to be arranged in a circle concentric with the stem and preferably at such distance from the center of the stem as will represent the mean diameter of the various circles of holes which the machine is to provide for: 13, a shaft journaled in each of the bearings 12: 14, a gear on the upper end of this shaft: 15, a gear journaled at the top of the stem and engaging the gears 14 and serving to exemplify means by which driving power may be transmitted to shafts 13: 16, a gear fast with gear 15 and serving to illustrate means by which motion may be received by the machine from a suitable source of driving power: 17 a longitudinally slotted skeleton bar having its inner end engaging the peripheral surface of stem bearing 2 and the downwardly presenting surface of shoulder 3, the outer end of the bar engaging the inner surface of ring 6, there being as many of these bars as are called for by the maximum number of holes in circular series which the machine is to provide for: 18, a flange projecting outwardly from the end of each of these radial bars and engaging under the ring 6: 19, a bolt in each of these flanges and engaging the tee-slot in ring 6: 20, an annular groove in the bearing at the foot of the stem: 21, a spring latch carried by the inner end of each of the radial bars and engaging the groove in the stem bearing: 22, a vertically disposed spindle-bearing fitted for sliding adjustment in each of the radial bars: 23, a screw carried by each of the radial bars and engaging the spindle-housing therein and serving for the radial adjustment of the spindle-bearing in the bar: 24, a drill spindle journaled in each of the radially adjustable spindle-bearings: and 25, a telescopic shaft connected by universal joints with a drill spindle and the top shaft 13 pertaining to it, there being one of these coupling shafts for each of the drill spindles, this arrangement of shaft serving to typify means for imparting rotary motion to the drill spindles under their varying conditions of adjustment.

The length of the radial arms is to be such as to provide for the minimum and maximum diameters of circles in which holes are to be drilled. The number of the radial arms

is to equal the maximum number of holes to be drilled in circular series in adjustable relationship to each other.

The general proportions of the machine and the stability of its framing is to be governed by the character of the work to be done, as regards size and number of holes to be produced, and this will largely control in the construction of the frame work. For instance, for comparatively light work a single upright, as illustrated by column 8, might serve in giving proper support to ring 6 and this ring, through the medium of the housing 9 and flange 10 or any equivalent overhead connection might serve in giving adequate support to the central stem. But in a machine for heavier work the single upright or column might not be sufficient and, in addition to the stem-support gotten from the ring, a top connection with the upright, as by the flange 11 might prove of high importance but, regardless of the means employed for the purpose, it is essential to my improvement that there be present a central bearing for the support of the inner ends of the radial bars, and a concentrically disposed ring for the support of the outer end of the bars.

The machine illustrated provides for twelve of the radial bars, thus providing for the drilling of twelve holes. The twelve bars being in the machine, the spindle bearings in the bars may be adjusted radially as desired, all of the spindles being adjusted to the same radius if the holes are to be in a circle. Assume, now, that instead of desiring a series of twelve holes but eight holes are to be produced. In such case four of the radial bars, together with the parts carried by them and also their coupling shafts are to be removed from the machine, the remaining eight radial bars being adjusted angularly as desired, and the spindle bearings being adjusted radially in the bars as desired. The upper radial bars can obviously be still further reduced and it may sometimes happen that with a comparatively small number of the bars in actual use other idle bars may remain in the machine without interfering with the proper angular adjustment of the bars actually in use.

When the machine is in condition for use, the outer ends of the radial bars are firmly held to the frame ring by bolts 19 and their inner ends are firmly held to the central stem bearing by clamping disk 4. By loosening the bolts and the clamping disk the bars are freed of angular adjustment. To remove a given radial bar, the clamping disk is first removed, thus freeing the inner ends of all of the bars, the spring latches serving, however, as a continuing support. The bolt 19 of the given bar is then to have its nut removed and, upon releasing the spring latch, the bar may be bodily withdrawn downwardly, after which the remaining bars may be angularly adjusted as desired and again firmly clamped.

I claim:—

1. A multiple drill comprising a central bearing, a ring concentrically surrounding the bearing, means for supporting the bearing and ring, a series of radial bars having their inner ends engaging the bearing and their outer ends engaging the ring, means for clamping the inner ends of the bars to the bearing, means for clamping the outer ends of the bars to the ring, and a spindle-bearing mounted for longitudinal adjustment on each bar, combined substantially as set forth.

2. A multiple drill comprising a central bearing, a ring concentrically surrounding the bearing, means for supporting the bearing and ring, a series of radial bars having their inner ends removably engaging the bearing and having their outer ends removably engaging the ring, means for clamping the inner ends of the bars to the bearing, means for clamping the outer ends of the bars to the ring, and a spindle-bearing mounted for longitudinal adjustment on each bar, combined substantially as set forth.

3. A multiple drill comprising a central bearing, a ring concentrically surrounding the bearing, a connection between and above the bearing and ring, means for supporting the connected bearing and ring, a series of radial bars having their inner ends engaging the bearing and their outer ends engaging the ring, means for clamping the inner ends of the bars to the bearing, means for clamping the outer ends of the bars to the ring, and a spindle-bearing mounted for longitudinal adjustment on each bar, combined substantially as set forth.

4. A multiple drill comprising a central bearing, a ring concentrically surrounding the bearing and provided with a downwardly open annular bolt slot, means for supporting the bearing and ring, a series of radial bars having their inner ends engaging the bearing and their outer ends engaging upwardly against the slotted portion of the ring, said bars being removable downwardly from the ring and central bearing, means for clamping the inner ends of the bars to the bearing, bolts engaging said annular slot and the outer ends of the bars to serve in clamping the outer ends of the bars to the ring, and a spindle-bearing mounted for longitudinal adjustment on each bar, combined substantially as set forth.

5. A multiple drill comprising a central bearing provided with a downwardly presenting surface, a ring concentrically surrounding the bearing, means for supporting the bearing and ring, a series of radial bars having their inner ends engaging the bearing and their outer ends engaging the ring, a removable clamping disk carried by the end of

the bearing below the inner ends of the bars and serving to clamp the inner ends of the bars against said downwardly presenting surface, means for clamping the outer ends of the bars to the ring, and a spindle-bearing mounted for longitudinal adjustment on each bar, combined substantially as set forth.

6. A multiple drill comprising a central bearing having an annular upwardly presenting latching surface, a ring concentrically surrounding the bearing, means for supporting the bearing and ring, a series of radial bars having their inner ends engaging the bearing and their outer ends engaging the ring, detachable means for clamping the inner ends of the bars to the bearing, a latch carried by the inner end of each bar and engaging said latching surface, means for clamping the outer ends of the bars to the ring, and a spindle-bearing mounted for longitudinal adjustment on each bar, combined substantially as set forth.

7. A multiple drill comprising a vertically disposed stem, means connected with the upper end of the stem for supporting it, a bearing at the lower end of the stem, a ring concentrically surrounding the bearing, means for supporting the ring, a series of radial bars having their inner ends engaging the bearing and their outer ends engaging the ring, means for clamping the inner ends of the bars to the bearing and the outer ends of the bars to the ring, and a spindle-bearing mounted for longitudinal adjustment on each bar, combined substantially as set forth.

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