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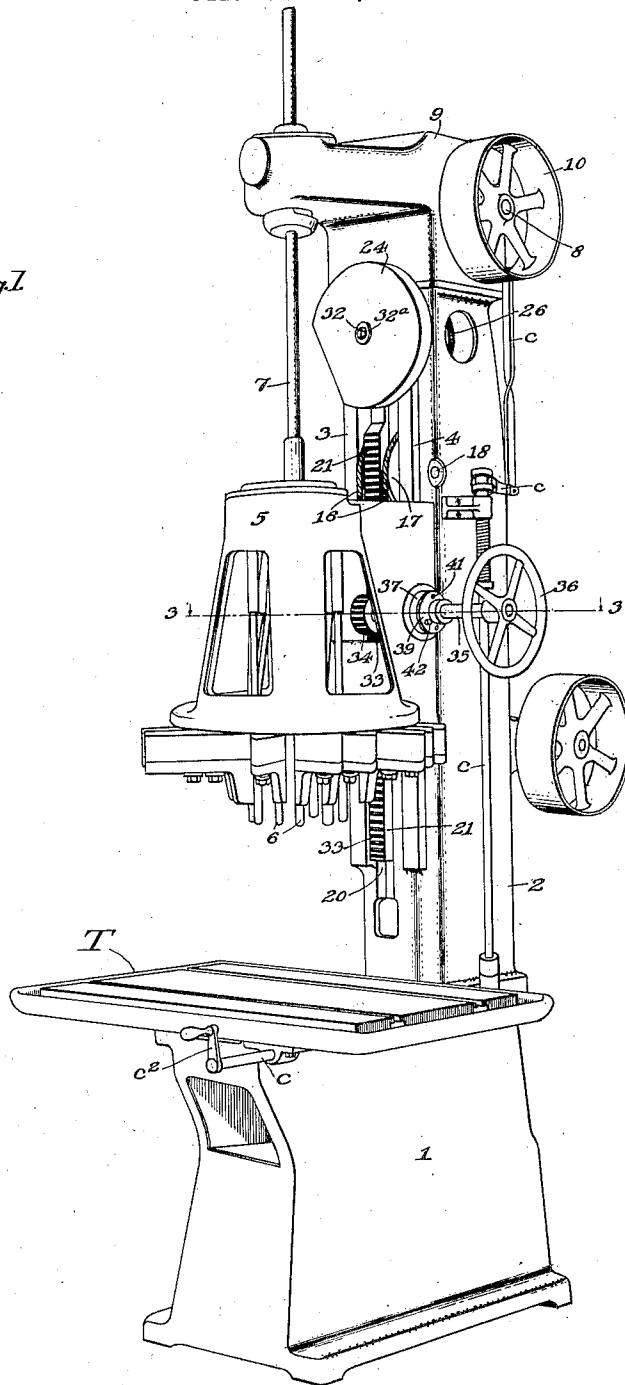
R. M. GALLOWAY

HEAD MOUNT FOR MULTIPLE DRILLS

Filed Nov. 19, 1924

4 Sheets-Sheet 1

Fig. 1



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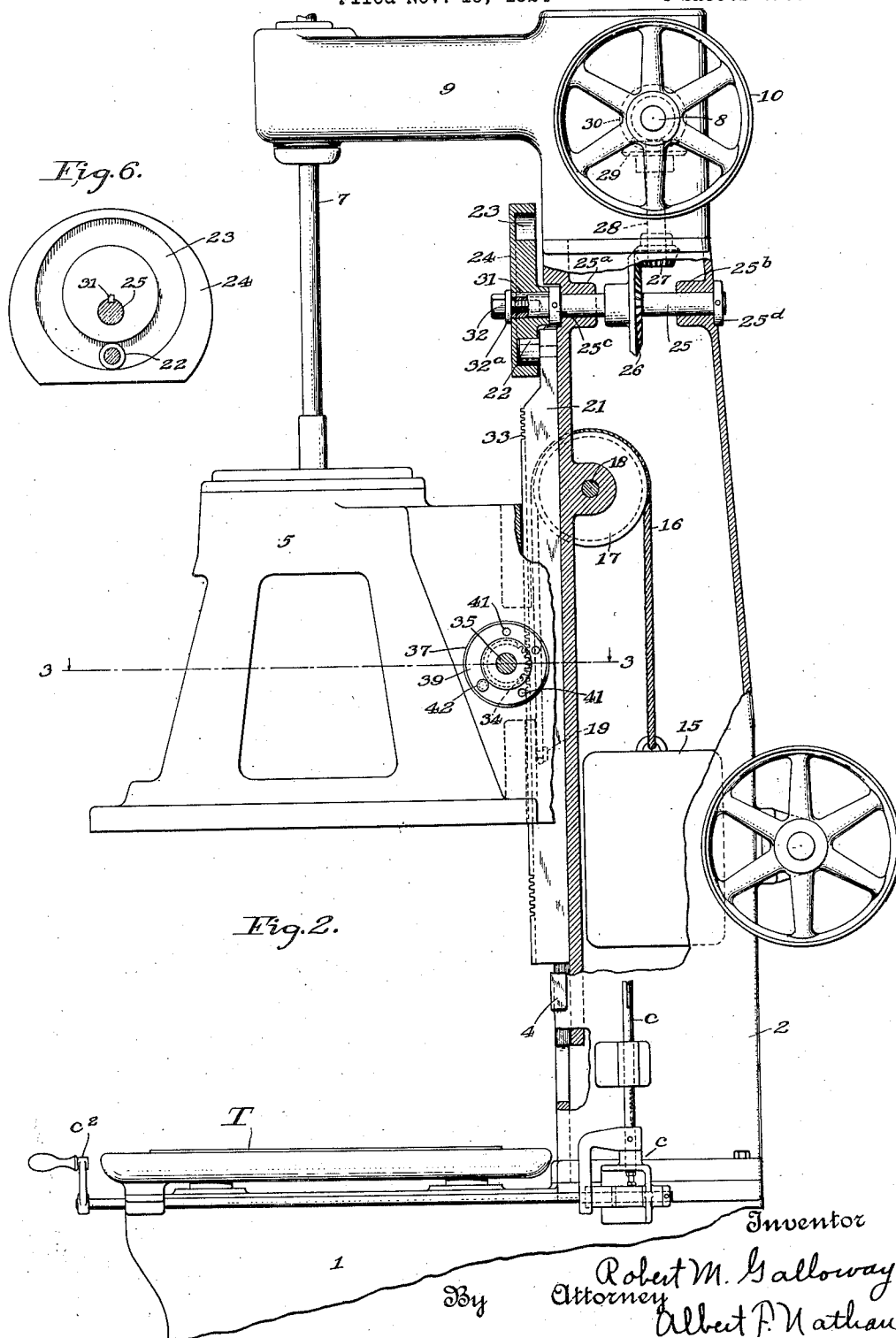
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Fig. 3.

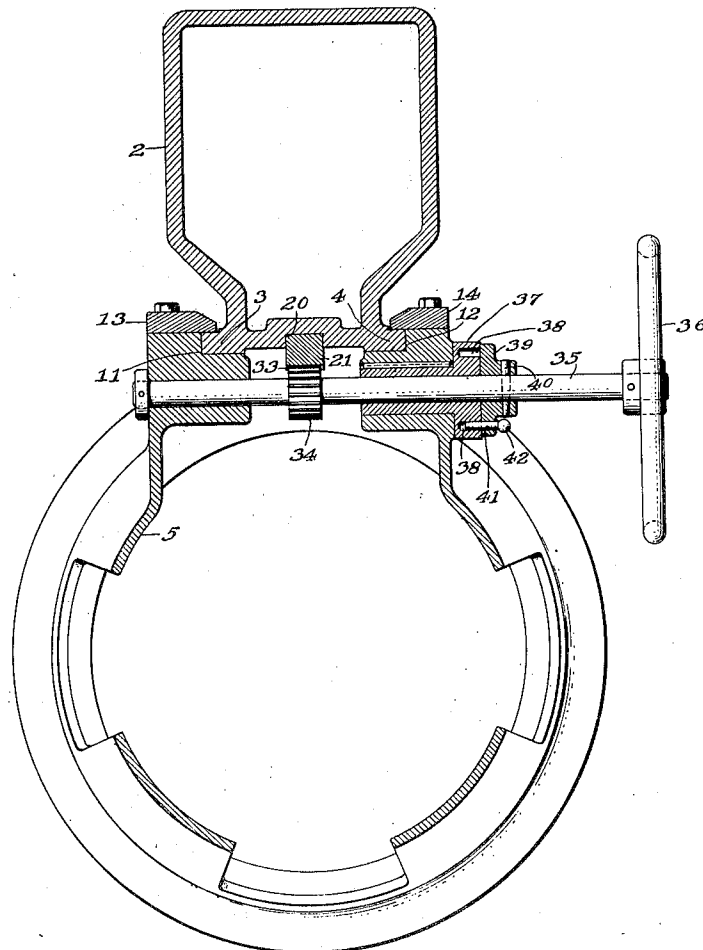


Fig. 4.

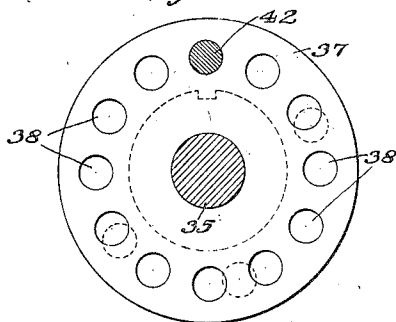
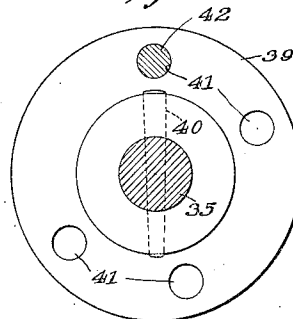


Fig. 5.



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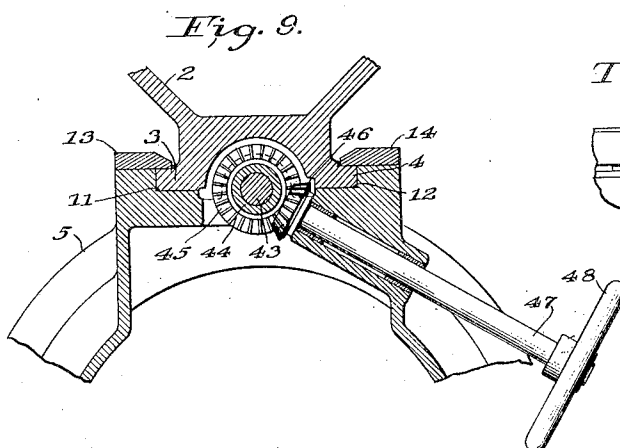
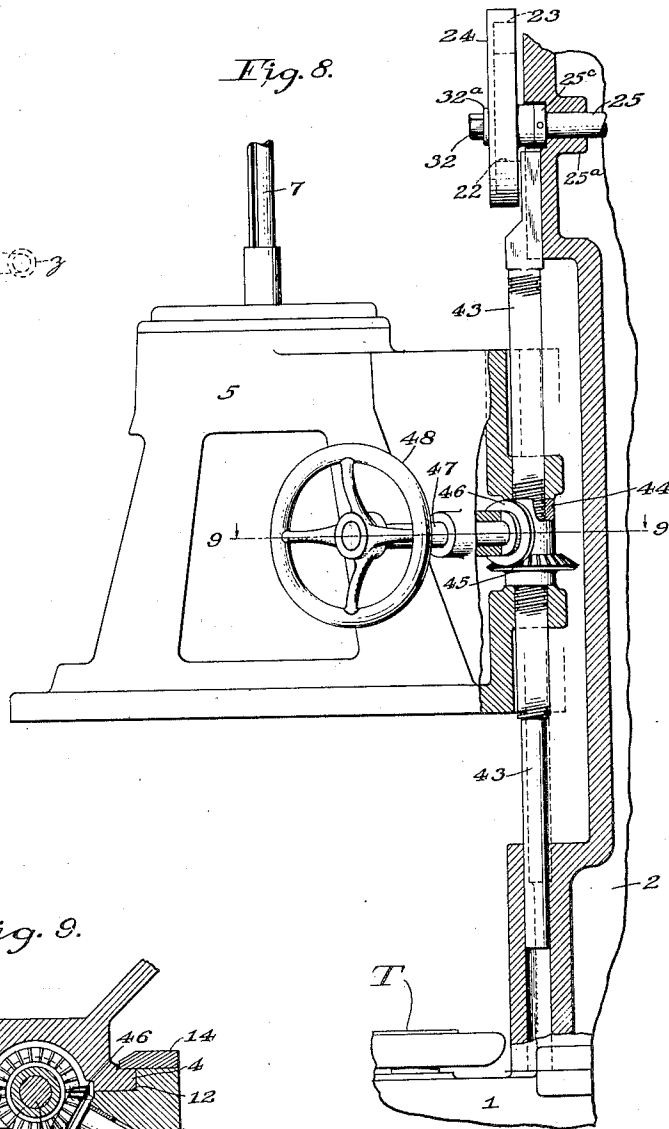
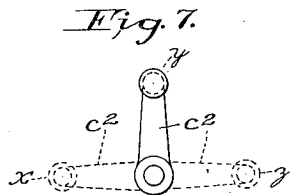
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

ROBERT M. GALLOWAY, OF RICHMOND, INDIANA, ASSIGNOR TO THE NATIONAL AUTOMATIC TOOL COMPANY, OF RICHMOND, INDIANA, A CORPORATION OF INDIANA.

HEAD MOUNT FOR MULTIPLE DRILLS.

Application filed November 19, 1924. Serial No. 750,811.

This invention relates to drilling machines and it deals more particularly with the mounting of the drill-head on the column; with power means for reciprocating the drill-head on the column and means for effecting an adjustment between the drill-head and its reciprocating mechanism.

It is an established fact that the capacity, efficiency and precision of machine tools are limited only by the construction of the machine itself and not by the cutting tools, inasmuch as the high-speed steel cutting tools as now constructed have been proven to be capable of speed and production far in advance of the capabilities of the machines themselves. Therefore each improvement in machine design which in any way increases the rigidity of the machine or renders it more easy of adjustment or manipulation becomes of great importance since it adds to both the production and precision of the machine.

This invention therefore has for an object to provide in a drilling machine improved means for rigidly yet slidably securing the drill-head to its supporting column; to provide power means for giving the drill-head reciprocations of a predetermined amplitude to cause the drills carried thereby to be fed into the work and retracted therefrom; and to provide improved means for adjusting the drill-head on its supporting column without effecting the feed of the drill-head. The invention also has for an object to provide means whereby the feed actuating member may readily be removed and replaced by another whenever it is desired to change the amplitude of the feed.

Other objects and advantages will be in part indicated in the following description and in part rendered apparent therefrom in connection with the annexed drawings.

To enable others skilled in the art so fully to apprehend the underlying features hereof that they may embody the same in the various way contemplated by this invention, drawings depicting a preferred typical construction have been annexed as a part of this disclosure and, in such drawings, like characters of reference denote corresponding parts throughout all the views, of which:—

Fig. 1 is a perspective view of a drilling machine embodying the present invention. Fig. 2 is a side elevation partly in section of a portion of Fig. 1. Fig. 3 is a horizontal section on the line 3—3 of Fig. 1. Figs. 4

and 5 are face views of certain perforated drill-head adjusting disks later to be referred to. Fig. 6 is a face view of the feed-actuating cam. Fig. 7 is a diagrammatic figure showing in full and dotted lines three positions of a feed-controlling crank later to be referred to. Fig. 8 is a detail vertical section showing another means for effecting an adjustment of the drill-head on its actuating member. Fig. 9 is a horizontal section substantially on the line 9—9 of Fig. 8.

While this invention is shown and described as embodied in a vertical or upright type of drilling machine it is to be understood that it likewise is adaptable to those types of drilling machines in which the drill-head is slidably mounted upon a horizontally or angularly disposed base.

Referring more particularly to the drawings the invention is disclosed as embodied in a drilling machine comprising a base 1 to which is secured an upright column 2 formed on its front face with guides 3 and 4. Upon the guides is rigidly yet slidably carried a drill-head 5 within which is adjustably mounted the usual drill-spindles 6 adapted to be rotated in a conventional manner by a power driven shaft 7. Power to rotate the drill-spindles and to feed the drill-head vertically on the guides 3 and 4 may enter the machine through a shaft 8 journaled in a cap 9 secured upon the upper end of the column and adapted to be driven by any suitable means such as, for example, by a belt pulley 10. Inasmuch as the means for rotating the shaft 7 and the spindles 6 form no part of the present invention detailed illustration and description thereof is deemed unnecessary.

The drill-head is formed at its rear side with guide-ways 11 and 12 fitted to the guides 3 and 4 and cleats 13 and 14 securely bolted to the drill-head prevent movement of the head away from the column. The drill-head is preferably counterbalanced by means of a weight 15 secured upon one end of a flexible connector or connectors 16 passing over pulleys 17 journaled upon a shaft 18 fixed in the column 2. The opposite end of the connectors 16 are attached to the drill-head as at 19 and thus the drill-head is counterbalanced in all of its positions on the guides 3 and 4.

As hereinbefore stated an important feature of this invention consists in the provision of power means for giving the drill-head

feed movements of a predetermined amplitude on the guides 3 and 4. This is preferably effected by means now to be described. Slidably mounted in a recess 20 formed in the column 2 is a member 21 operatively connected with the drill-head and which is adapted to be reciprocated by any suitable mechanism. The member 21 may conveniently be in the nature of a slide-bar and it may be reciprocated by means of a suitable connection with an eccentric device adapted to be actuated from the shaft 8. Preferably, but not necessarily, the member 21 carries a roller 22 adapted to track a cam-groove 23 formed in a disk 24 fixed upon a shaft 25. The shaft 25 is held against endwise movement in its bearings 25^a and 25^b by collars 25^c and 25^d and may be rotated from the shaft 8 by any suitable means such as, for example, bevel gears 26 and 27, vertical shaft 28 and bevel gears 29 and 30 of which the latter may be secured to the shaft 8. Thus it will be perceived that rotation of the disk 24 will cause reciprocation of the member 21, and as this member is attached to the drill-head the latter will likewise be reciprocated on the guides 3 and 4. The disk 24 is locked to the shaft 25 as by means of a key 31 and is held against endwise movement thereon by a screw 32 passing through a washer 32^a and threaded into the end of the shaft 25. It will be observed that this construction provides for the ready removal of the disk 24 and its replacement by another disk having a different cam groove whenever it is desired to change the feed movements of the drill-head. During this change the drill-head is held against falling by means of the counterweight 15.

It is frequently desirable, when changing from one piece of work to another piece of a different height, to change the elevation of the drill-points without changing their extent of feed. This invention provides exceedingly simple and efficient means for effecting this adjustment. As shown in Figs. 1, 2 and 3 the member 21 is provided with rack-teeth 33 which mesh with a pinion 34 fixed to a shaft 35 journaled in the drill-head. The shaft 35 also carries a hand-wheel 36 by means of which the shaft 35 and pinion 34 may be rotated. It will readily be perceived that rotation of the hand-wheel will cause the pinion to roll up or down the rack-bar (dependent upon the direction of rotation) and that it will carry with it the drill-head 5.

To maintain the drill-head in any position of adjustment on the rack-bar and to lock the two together against relative movement there is secured to the drill-head a disk 37 provided with a substantial number of equally spaced holes 38. A second disk 39 is fixed to the shaft 35 as by a pin 40 and is provided with a plurality of unequally spaced holes 41. A pin 42 may be inserted into aligned holes 38 and 41 to lock the disk

39 to the stationary disk 37 thereby to prevent rotation of the shaft 35 and to hold the drill-head in any position of adjustment with respect to the member 21. The holes 41 are so arranged in the disk 39 that one of the holes will be aligned with one of the holes 38 at each slight revolution (about 7.5 degrees) of the disk 39. Thus this construction permits the drill-head to be adjusted any desired amount from the full length of the rack or to a very small fraction of an inch.

While the adjustable connection between the feed actuator 24 and the drill-head is herein shown and described as preferably comprising a rack-and-pinion it is to be understood that the invention also contemplates various other adjustable or extensible connections. Another desirable form is shown in Figs. 8 and 9 in which the reciprocating member is in the form of a shaft 43 having a threaded connection with nut 44 rotatably but nontranslatably journaled in the drill-head and adapted to be rotated on the screw 43. The nut 44 may be rotated by bevel gears 45 and 46 of which the former is fixed to the nut 44 and the latter is secured upon a shaft 47 journaled in the drill-head and adapted to be rotated by a hand-wheel 48. Thus it will be understood that rotation of the nut 44 on the threaded shaft 43 will cause the drill-head to be moved lengthwise of the shaft.

From the foregoing it will be perceived that there has been provided simple and efficient means for rigidly mounting the drill-head on the column; power means for giving the drill-head reciprocations of a predetermined amplitude; and means for adjusting the drill-head with respect to its actuating mechanism and to the work-support.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can, by applying current knowledge, readily adapt it for various utilizations by retaining one or more of the features that, from the standpoint of the prior art, fairly constitute essential characteristics of either the generic or specific aspects of this invention and, therefore, such adaptations should be, and are intended to be, comprehended within the meaning and range of equivalency of the following claims:—

Having thus revealed this invention, I claim as new and desire to secure the following combinations and elements, or equivalents thereof, by Letters Patent of the United States:

1. A drilling machine combining a box-type frame provided with spaced guides; a drill-head fitted to said guides and adapted to be moved thereon; a slide-bar movable on said frame and slidingly fitted to a guideway provided by the face of said frame adjacent the drill head and intermediate said guides; a rotary cam operatively connected to said

slide-bar to reciprocate the latter; and an extensible gear connection between said slide-bar and said drill-head to cause the latter to reciprocate with the former and to permit of adjustment between the two.

2. A drilling machine combining a vertical column; a drill-head slidably mounted upon vertical guideways provided by the column; a bar slidably mounted in said column and provided with rack-teeth; a rotary cam engaging a stud carried by the upper end of said bar to reciprocate said bar; a pinion carried by said drill-head and meshing with said rack-bar; means to prevent rotation of said pinion; said pinion and rack-teeth affording means to transmit to the drill-head the reciprocatory movements of said bar; and means to rotate said pinion to effect an adjustment of said drill-head relative to said bar.

3. A drilling machine as set forth in claim 2 characterized by this, that the pinion is carried by a shaft rotatably journaled in the drill-head and the means to prevent its rotation comprises a perforated disk secured to the drill-head, a second perforated disk fixed to the rotatable shaft and a pin adapted to be inserted into aligned perforations in the two disks to lock the rotatable disk to the fixed disk.

4. A drilling machine combining a column; a drill-head slidably mounted thereon; a bar translatably mounted in said column; means to reciprocate said bar; a shaft rotatably journaled in said drill-head; an element carried by said shaft and having an operative connection with said bar to cause said bar to reciprocate said drill-head; means to rotate said shaft and element to effect an adjustment of said drill-head relative to said

bar; a locking device to prevent accidental rotation of said shaft comprising two relatively rotatable members of which one is provided with a plurality of equally spaced apertures and the other of which is provided with unequally spaced apertures, one of said members being rotatable with said shaft, the apertures in said two members being so arranged that a relative rotation between the two members, an amount equal to the spacing of the equally spaced apertures, will cause a plurality of said apertures to be successively aligned; and a pin adapted to be inserted in the aligned apertures.

5. A drilling machine, as set forth in claim 4, characterized by this that the apertures in the two relatively rotatable members are so arranged as to provide a vernier adjustment between the two.

6. A drilling machine combining a column; a drill-head slidably mounted upon said column; a power shaft journaled in the column; an eccentric member secured upon one free end of said shaft, said eccentric member being readily removable from said shaft for replacement by another member of different eccentricity; a reciprocatory element fitted to a guideway on the forward face of said column; a stud projecting outwardly from said reciprocatory element and maintained in effective engagement with said eccentric member, said element providing an operable connection between said eccentric member and said drill-head to cause the former to reciprocate the latter on the column; and means to effect a relative bodily adjustment between the eccentric member and said drill-head.

In witness whereof, I have hereunto subscribed my name.

ROBERT M. GALLOWAY.