March 6, 1928. 1,661,179

C. JOBST

MULTIPLE DRILLING MECHANISM

Filed Feb. 19, 1925 5 Sheets-Sheet 1

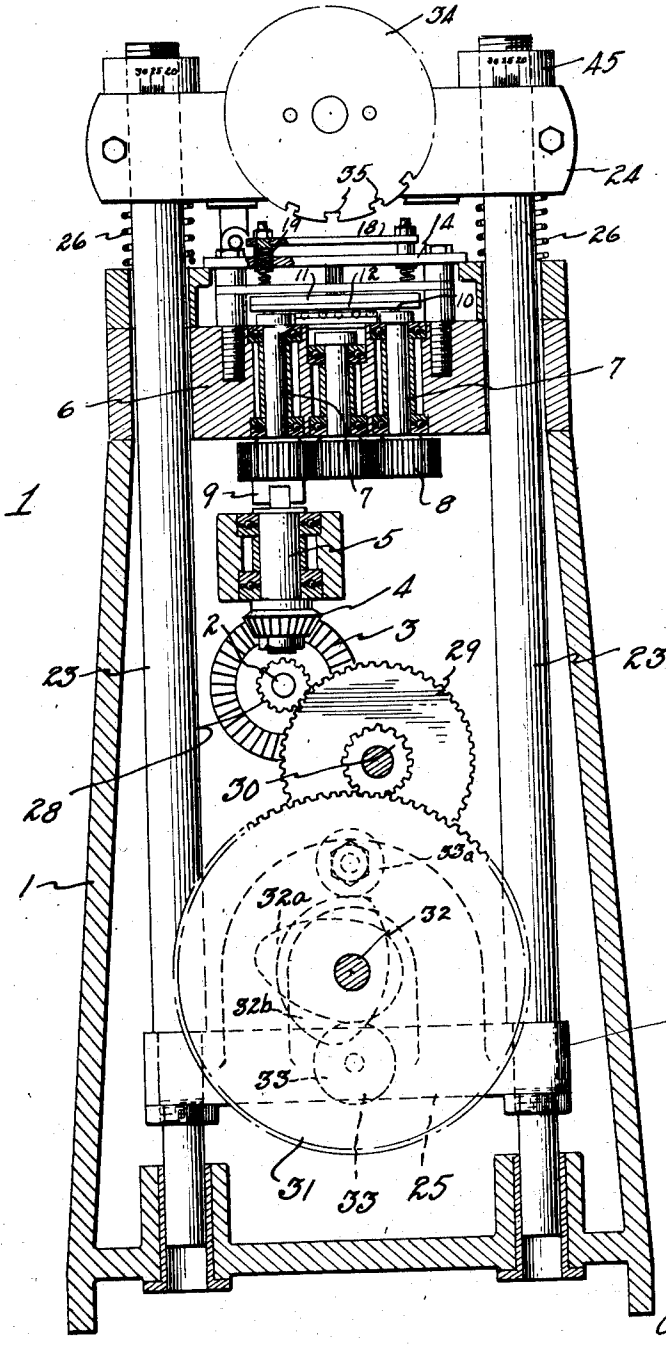

Fig. 1

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CONRAD JOBST

BY
Whittemore, Hulbert & Whittemore
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MULTIPLE DRILLING MECHANISM

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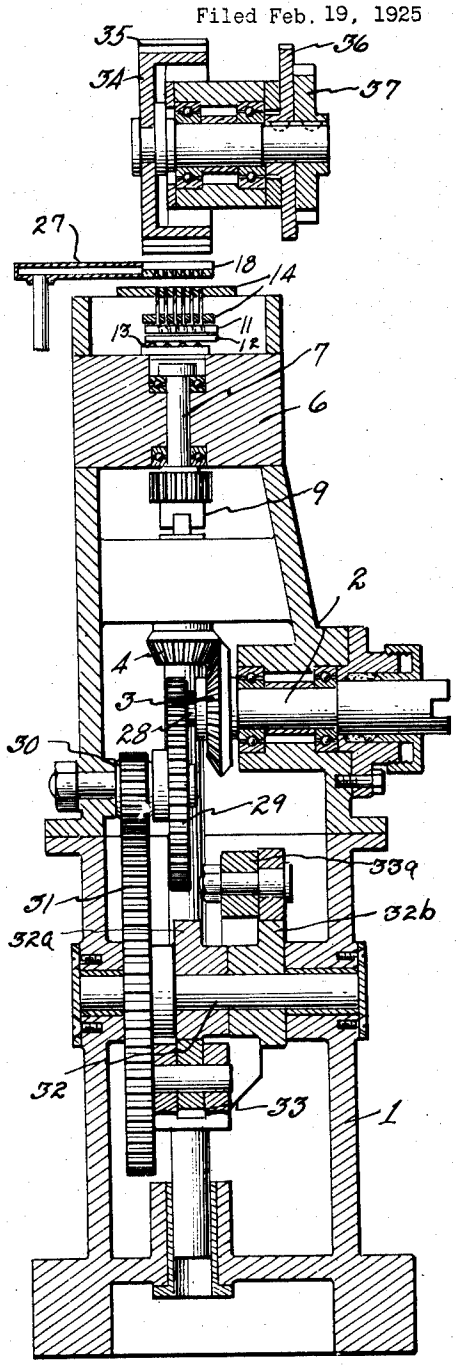

Fig. 2.

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MULTIPLE DRILLING MECHANISM

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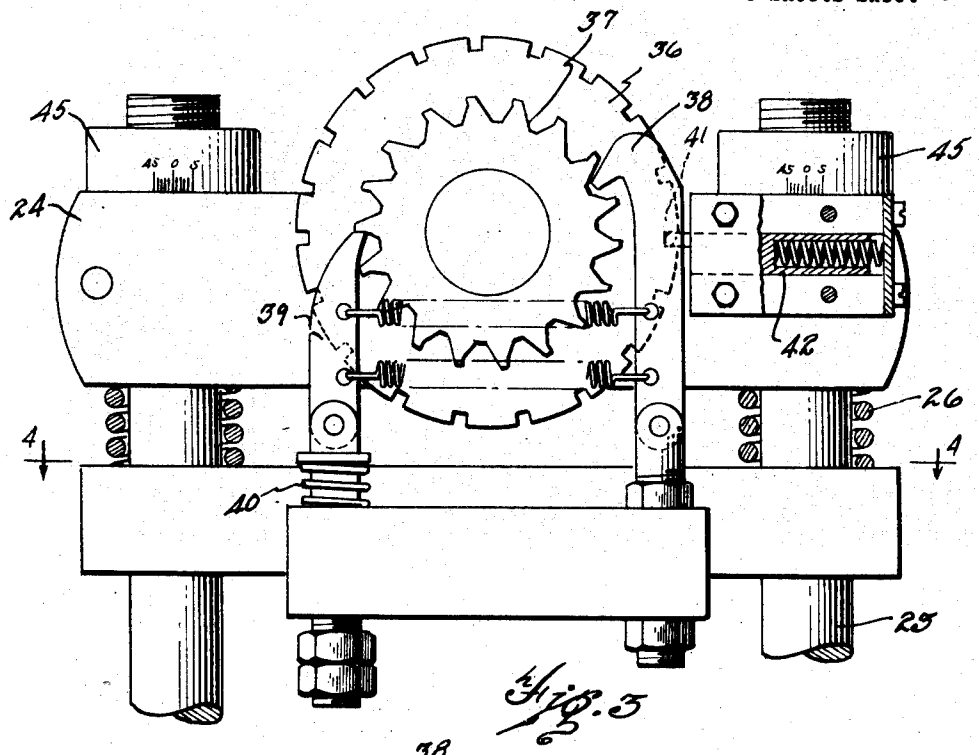

Fig. 3

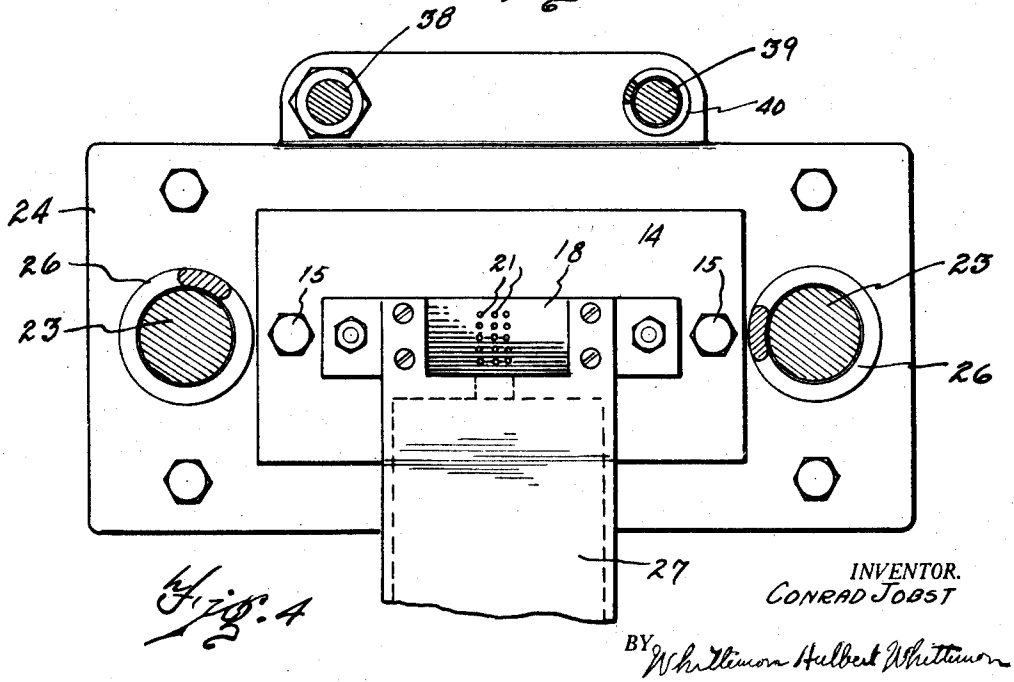

Fig. 4

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MULTIPLE DRILLING MECHANISM

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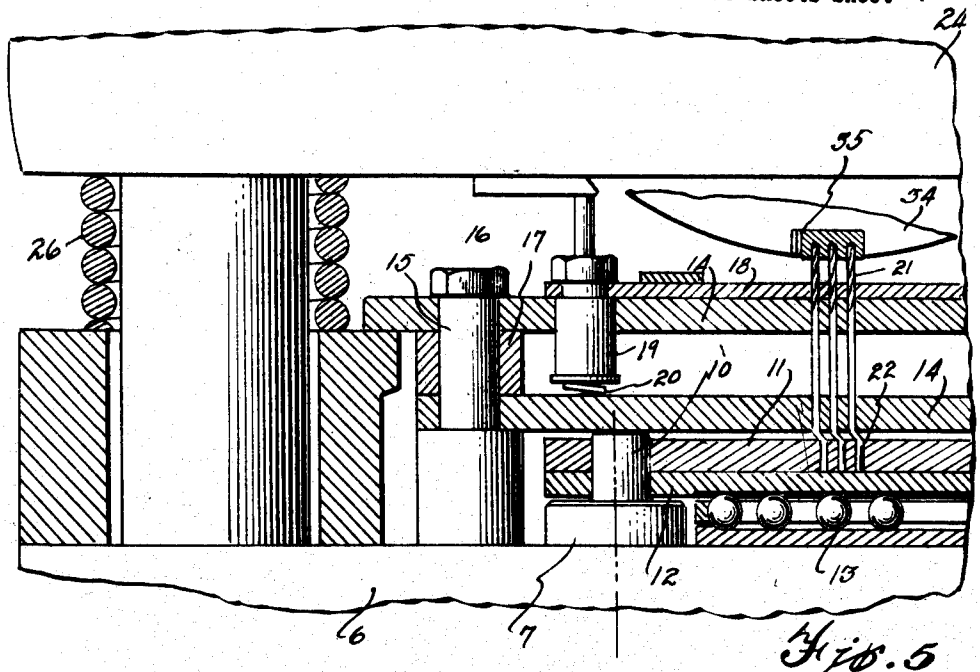

Fig. 5

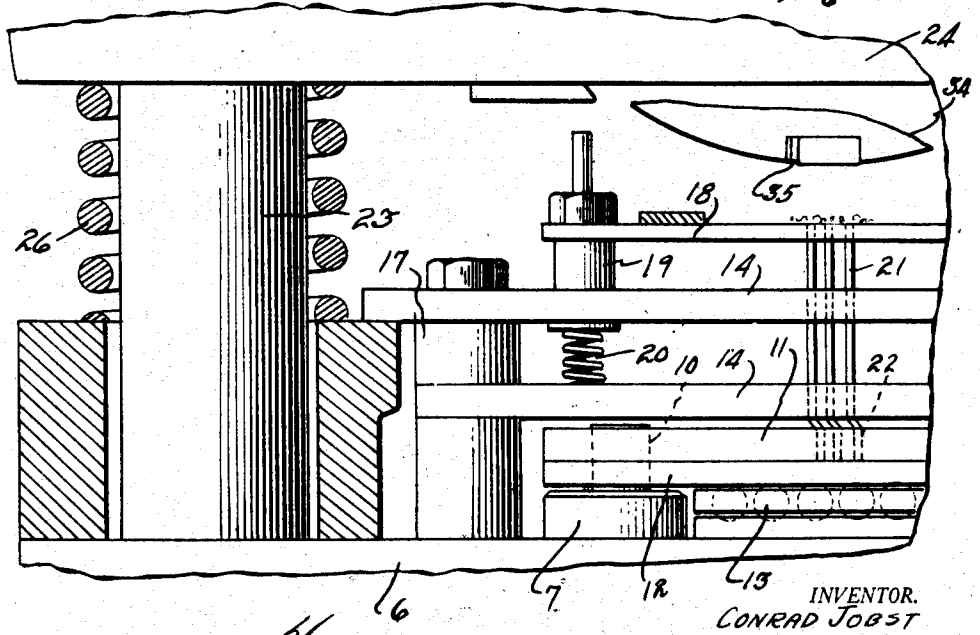

Fig. 6

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March 6, 1928. 1,661,179

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MULTIPLE DRILLING MECHANISM

Filed Feb. 19, 1925 5 Sheets-Sheet 5

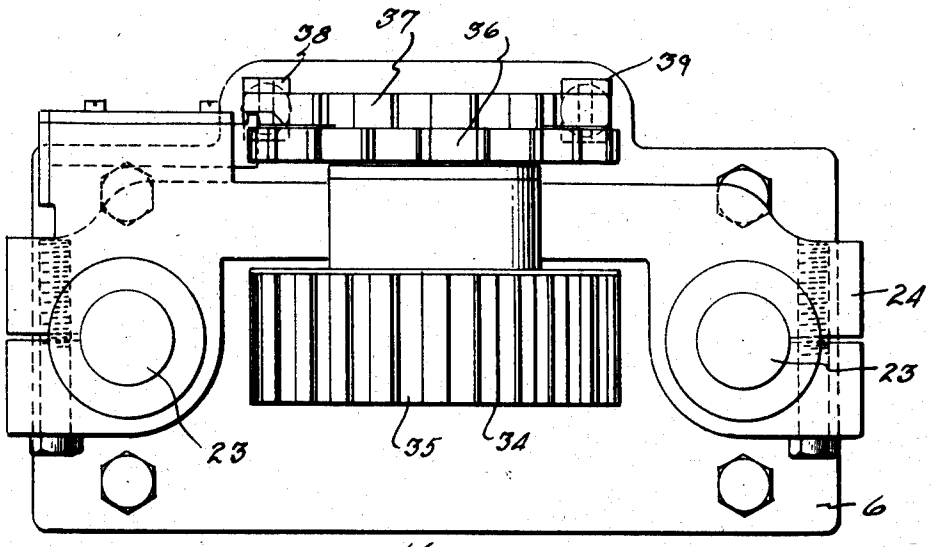

Fig. 7

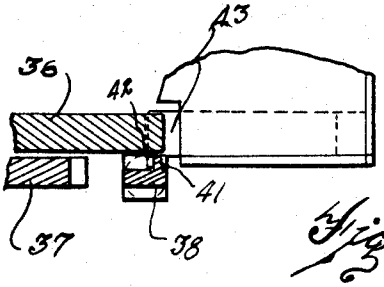

Fig. 8

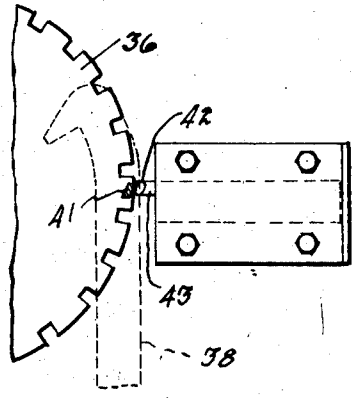

Fig. 9

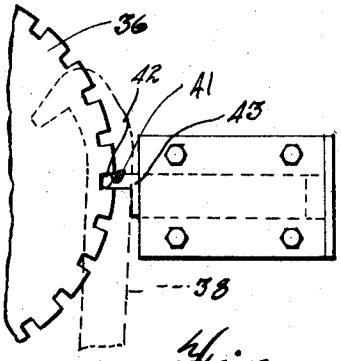

Fig. 10

INVENTOR.
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Patented Mar. 6, 1928. 1,661,179

UNITED STATES PATENT OFFICE.

CONRAD JOBST, OF TOLEDO, OHIO, ASSIGNOR TO THE TOLEDO AUTOMATIC BRUSH MACHINE COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

MULTIPLE DRILLING MECHANISM.

Application filed February 19, 1925. Serial No. 10,289.

It is the object of the invention to obtain a construction of multiple drilling machine which is capable of simultaneously drilling groups of closely spaced holes of small diameter. It is a further object to provide for exchangeable drilling units so that either the grouping or the size of the holes may be varied. Still another feature of the invention is the means for successively feeding the work to be drilled into operative relation with the drilling unit. The invention therefore consists in various features of construction as hereinafter set forth.

In the drawings:

Figure 1 is a sectional elevation of the machine;

Figure 2 is a vertical section in a plane at right angles to Figure 1;

Figure 3 is a rear elevation showing the work feeding and registering mechanism;

Figure 4 is a sectional plan view of Figure 3;

Figures 5 and 6 are views similar to portions of Figures 1 and 2.

Figure 7 is a plan view of the machine;

Figures 8, 9 and 10 are detailed views of the index wheel.

While my machine may be used for various kinds of work, I have specifically illustrated and will describe its application to the drilling of tooth brush backs for the reception of the bristle tufts. For such use the holes to be bored are of relatively small diameter and are grouped in rows varying somewhat in spacing. Moreover different styles and sizes of brushes require variation in the grouping and size of holes. Thus it would be difficult, if not impossible, to perform such work upon any construction of machine having individual spindle chucks for holding separate drills. With my improved construction, however, such work can be easily performed and changes in the grouping or size of holes may be made with small labor and expense.

In general construction my improved machine comprises a suitable frame 1 having journaled therein the drive shaft 2 connected by bevel gears 3 and 4 with the vertical driven shaft 5. Above this shaft 5 there is arranged a cross head 6 having journaled therein a plurality of parallel spindles 7. These are all driven in the same direction and at the same angular speed through the medium of intermeshing gear wheels 8 one of which is in alignment with the shaft 5 and is coupled therewith through the medium of the clutch 9.

The upper ends of the spindles 7 are provided with upwardly projecting eccentric pins 10, all of which are in the same eccentric relation to their respective spindles. 11 and 12 are plates apertured to form bearings for engaging the eccentric pins 10, which impart to said plates an oscillatory movement. The upper plate 11 is apertured to correspond to the pattern or arrangement of holes which are to be simultaneously drilled, but the lower plate 12 is imperforate and is preferably supported for freedom in oscillation upon a ball thrust bearing 13. Above the plates 11 and 12 are one or more plates 14, which are apertured to correspond with the apertures in the plate 11 and form guides for the drills. The plates 14 are stationary and are held in proper relation to the plates 11 and 12 by engaging studs or pins 15 projecting upward from the cross head 6. These pins are threaded at their upper ends for the engagement of clamping nuts 16 by means of which the plates 14 are secured in position, spacers 17 being interposed between the plates. Above the plates 14 there is preferably a third plate 18 which is also apertured in exact registration with the apertures in the plates 14 and forms a guide for the points of the drills. The plate 18 is yieldably supported in relation to the plates 14 by engaging headed pins 19 slidable in the plate 14 and resiliently pressed upward by the springs 20. As shown, the pins 19 are hollow and the springs are housed therewithin.

With the construction as just described, it will be apparent that the rotation of the spindles 7 will impart an oscillatory movement to the plates 11 and 12, every point in which will traverse a circular orbit of the same radius as the eccentricity of the pins 10. The drills 21 which engage the apertures in the plates 14 and 18 are provided

with offset downward extensions or cranks 22 and these are of a radius corresponding to the radius or eccentricity of the pins 15. Thus the crank 22 may be engaged with the apertures in the plate 11 and in the oscillation of said plate will be revolved around the axes of their respective drills, imparting to the latter a rotary movement. The end thrust on the drills is taken by the plate 12 and as this is supported on the anti-friction ball bearing 13, it will not interfere with the free oscillation.

In the operation of the machine the work is pressed downward upon the plate 18, displacing the same and thereby permitting the drills to enter. When the pressure is released, the springs 20 will again raise the plate 18, thereby stripping the work from the drills, the chips being removed by air from a blower nozzle 27.

To feed successive pieces of work into registration with the drills and to automatically perform the operation of depressing and releasing the work, I preferably provide the following construction: Slidably secured within the frame 1 are vertically extending rods 23, which at their upper ends have connected thereto the cross head 24 and at their lower ends the cross head 25. Springs 26 sleeved upon the rods 23 and resting upon a portion of the frame 1 serve to yieldably move the rods and cross heads upward. The drive shaft 2 is connected by a step-down train of gearing 28, 29, 30 and 31 to a shaft 32 having mounted thereon the cams 32^a and 32^b. These cams engage roller bearings 33 and 33^a, secured to the cross head 25 and respectively below and above the cams 32^a and 32^b. The arrangement is such that once in each cycle of the cam the cross head 25 will be first depressed and then raised, reciprocating the rods 23 and cross head 24.

Upon the cross head 24 is mounted a work holder of any suitable construction. As shown in Figure 1, this holder is in the form of a rotary drum 34 having peripheral clamps 35 for the articles to be drilled, such for instance as tooth brush handles. Connected with the drum 34 is an index wheel 36 and a ratchet wheel 37, which latter is rotatively actuated in the upward and downward movement of the cross head by pawls 38 and 39. Both of these pawls are pivotally mounted on the frame 1, but the pawl 39 is provided with a yielding support formed by the spring 40. The pawl 38 has connected thereto a cam lug 41 which, during the upward movement of the cross head, will engage a bearing 42 on a detent 43 cooperating with the index wheel 36, thereby releasing said detent to permit rotation of the wheel. The arrangement is such that during the upward movement of the cross head after the drills have been withdrawn from the work and during the downward movement of said cross head before the drills engage the work, motion is communicated to the ratchet wheel through the medium of the pawls 38 and 39 sufficient to rotate said wheel one or more notches of the index wheel. This will successively bring the brush backs in the clamps 35 upon the periphery of the drum into registration with the multiple drills, holding each piece in this position during the drilling operation.

It is desirable to accurately determine the depth to which the drills enter the work. This may be accomplished by an adjustment of the cross head 24 upon the rods 23. As shown, this adjustment is effected by threading the upper ends of the rods and engaging therewith nuts 45. These may be calibrated so that by turning to certain indications the cross head may be raised or lowered a predetermined amount, which will correspondingly alter the depth to which the drills enter the work.

What I claim as my invention is:

1. In a multiple drill, the combination of a plurality of parallelly arranged plates having drill receiving apertures therein arranged in a predetermined pattern, the same in each plate, of drills engaging the apertures of one of said plates and provided with similar offset crank portions engaging the corresponding apertures of another of said plates, an imperforate plate adjacent to the crank receiving plate and forming a thrust bearing for the ends of said crank portions, means for simultaneously oscillating said crank receiving plate and imperforate plate to simultaneously rotate all of said drills, a fixed bed for supporting said plates and an anti-friction bearing between said bed and said imperforate plate for receiving the end thrust of the drills while permitting the free oscillation of said plate.

2. In a multiple drill, the combination with a frame having a crosshead secured thereto, of a pair of vertical shafts journaled in said crosshead, each having a vertical crank pin projecting above said crosshead, means for imparting a driving torque to each of said shafts, an oscillating member having apertures for engaging said cranks, an anti-friction bearing between said oscillating member and said crosshead, perforated pattern plates parallel to said crosshead and spaced from the same, drills engaging said perforations, each having an integral crank engaging said oscillating member and means for removably securing said pattern plates to said crosshead permitting the removal of said oscillating member, pattern plates and drills as a unit.

3. In a multiple drill, the combination with a fixed member, of a pair of vertical shafts journaled in said fixed member, each having a crank pin projecting therefrom, an oscillating member having apertures for en-

gaging said crank pins, an anti-friction bearing between said oscillating member and said fixed member, perforated pattern plates parallel to said fixed member and spaced from the same, drills engaging said perforations, each having an integral crank engaging said oscillating member, a pair of pins slidable in one of said pattern plates, a stripping plate supported by said pins and having perforations aligned with said pattern plates, and springs between said pins and the other of said pattern plates.

In testimony whereof I affix my signature.

CONRAD JOBST.