Jan. 29, 1924. 1,481,983

H. M. BRIGHTMAN

MACHINE FOR COUNTERBORING NUTS

Filed Oct. 28, 1921 3 Sheets-Sheet 1

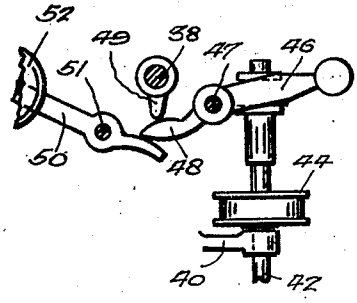


FIG. 3

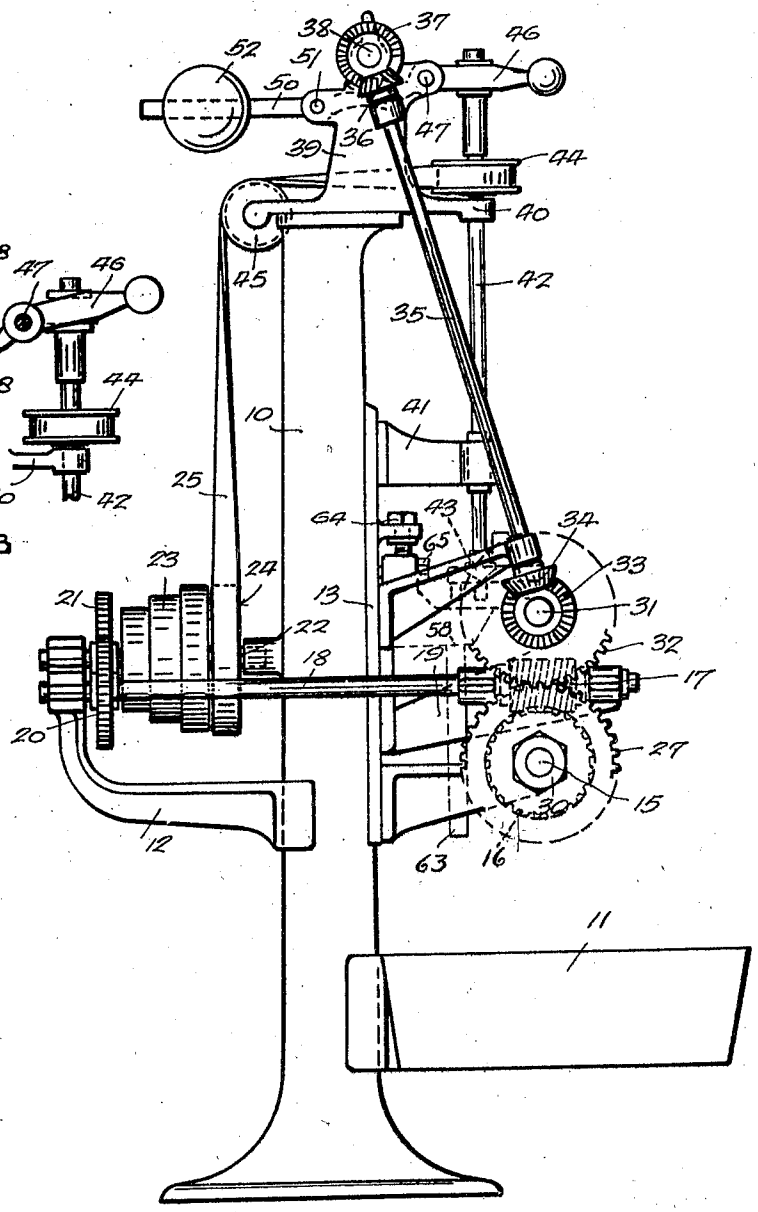


FIG. 1

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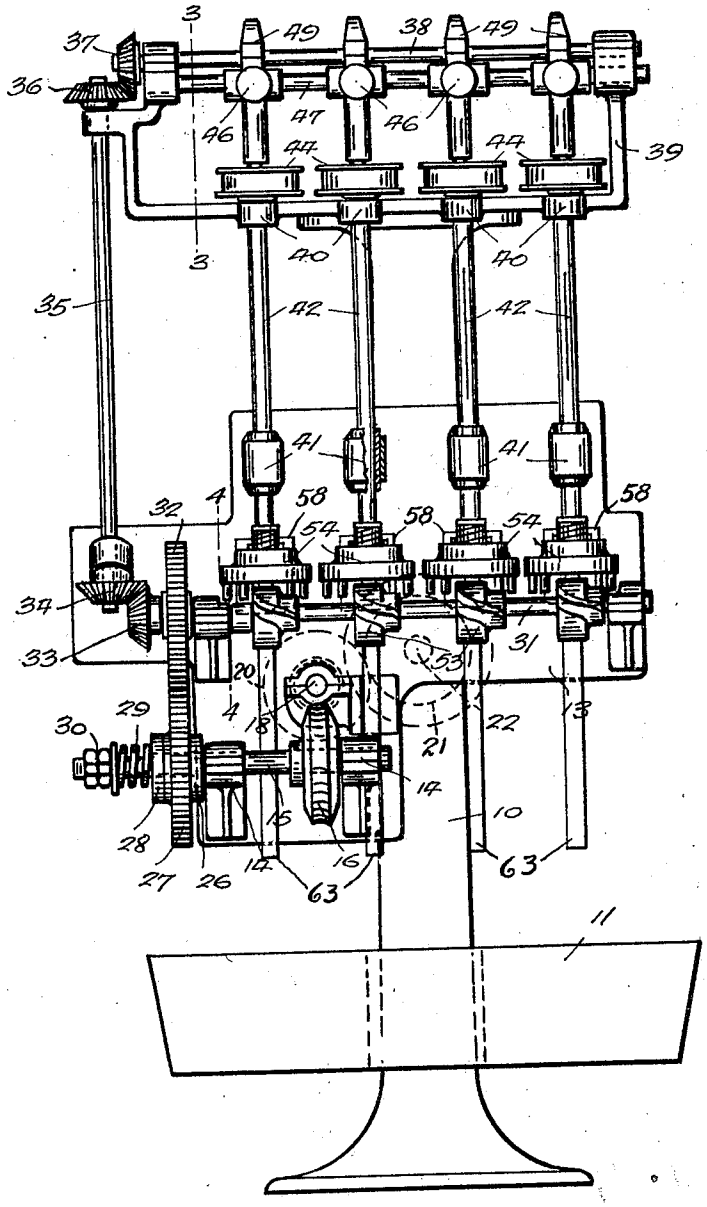


FIG. 2

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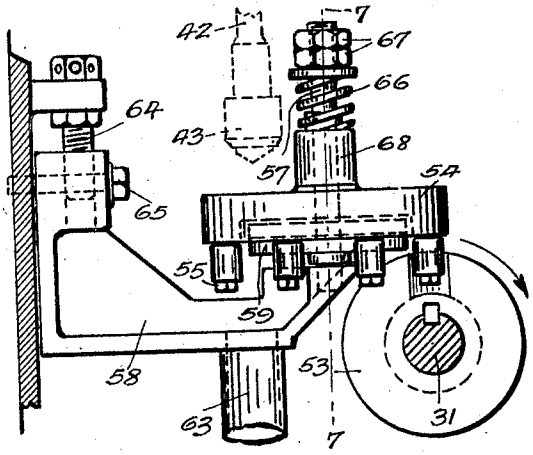


FIG. 4

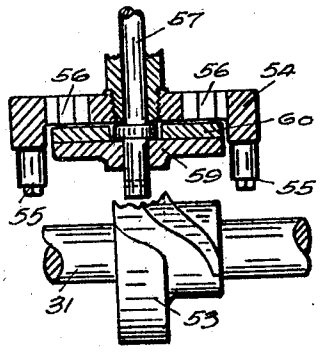


FIG. 7

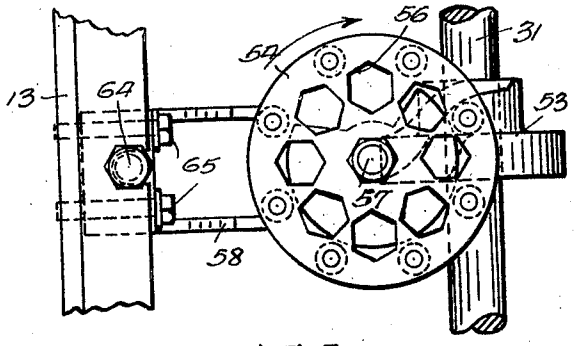


FIG. 5

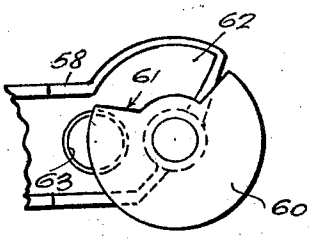


FIG. 8

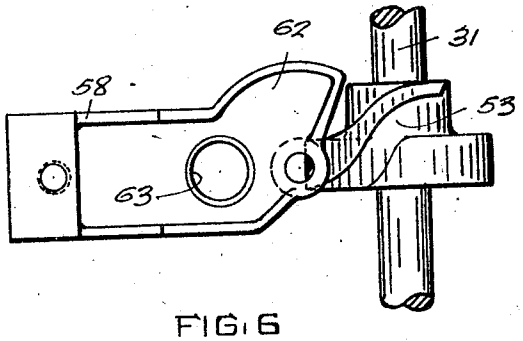


FIG. 6

INVENTOR.

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Patented Jan. 29, 1924. 1,481,983

UNITED STATES PATENT OFFICE.

HARRISON M. BRIGHTMAN, OF COLUMBUS, OHIO, ASSIGNOR OF ONE-FOURTH TO G. F. BRIGHTMAN, ONE-FOURTH TO H. L. BRIGHTMAN, AND ONE-FOURTH TO J. H. BRIGHTMAN, ALL OF COLUMBUS, OHIO.

MACHINE FOR COUNTERBORING NUTS.

Application filed October 28, 1921. Serial No. 510,990.

To all whom it may concern:

Be it known that I, HARRISON M. BRIGHTMAN, a citizen of the United States of America, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Machines for Counterboring Nuts, of which the following is a specification.

My present invention relates particularly to machines for counterboring nuts, my object being the provision of an apparatus of this character and for this purpose which will be simple and inexpensive, entirely automatic in its operation, effective and efficient in use and strong and durable.

Other objects relating more particularly to the details, as well as the resulting advantages of my invention will clearly appear in the course of the following description, reference being made to the accompanying drawings, which form a part of this specification, and in which,

Figure 1 is a side elevation of my improved machine,

Figure 2 is a front elevation, certain parts being omitted for better view of the remaining parts,

Figure 3 is a detail vertical section taken on line 3—3 of Figure 2,

Figure 4 is a vertical section taken on line 4—4 of Figure 2,

Figure 5 is a sectional top plan view of the parts shown in Figure 4,

Figure 6 is a detail plan view of certain of the parts shown in Figure 5,

Figure 7 is a vertical sectional view taken on line 7—7 of Figure 4, and

Figure 8 is a detail plan view of certain of the parts shown in Figure 5.

Referring now to these figures my invention proposes a machine for counterboring nuts which includes the main upright frame 10 having a forwardly projecting nut receiving tray 11 adjacent to its forward end and having a rearwardly projecting bearing bracket 12 at a point above the tray 11.

Above the tray 11 and as shown particularly in Figure 2, the upright frame 10 supports a plate 13 whose lower portion has forwardly outstanding bearing brackets 14 for a worm shaft 15 and on this worm shaft is a worm wheel 16 engaged by the worm 17 of a horizontal shaft 18 whose portion forwardly of the upright 10 is journaled in portions of a bearing bracket 19 projecting forwardly from the plate 13.

The rear portion of the shaft 18 extends rearwardly beyond the upright 10 and is journaled in a portion of the beforementioned bracket 12. This rear portion of shaft 18 also has a gear 20 engaged by the gear 21 of a pulley shaft 22 on which pulleys 23 and 24 are mounted, the former being adapted to receive a belt leading from any suitable source of power and the latter receiving a belt 25 for a purpose to be presently described.

The shaft 15 has at one end a collar 26 as shown in Figure 2 and a gear 27 loosely fits on this shaft against the stationary collar 26 and is engaged by a friction collar 28 disposed on the shaft and tightly against gear 27 to hold the latter in frictional engagement with the rigid collar 26 by means of a spring 29 and nuts 30 threaded on the shaft 15 to adjust the tension of the spring.

By means of this frictionally held gear 27 rotation is transmitted from the shaft 15 to the cam shaft 31 parallel with and above the shaft 15, gear 27 engaging the gear 32 secured on the cam shaft. At one end the cam shaft 31 has a bevel gear 33 engaging a bevel gear 34 at the lower end of an upwardly and rearwardly inclined shaft 35 which as seen in Figures 1 and 2 has at its upper rear end a bevel gear 36 engaging the bevel gear 37 at one end of a trip shaft 38.

The shaft 38 is journaled in bearings within an upper frame 39 mounted at the upper end of the upright 10 and this frame has forwardly outstanding bearing arms 40 which cooperate with bearing arms 41 extending forwardly from the upper portion of the beforementioned plate 13, to support vertical spindles 42 which are both rotatable and lengthwise shiftable. Several of these spindles may be employed as seen in Figure 2, but while capable of multiplication in number, a single spindle is all that is essential and the machine will be so treated in the description following.

The lower end of the drill spindle carries a counter-boring tool 43, and upon the upper portion of the spindle, above the bearing arm 40 of the upper frame 39, a pulley 44 is splined on the spindle and receives one end of the belt 25 extending from the spindle driving pulley 24, around a guide roller 45.

The upper end of the spindle 42 is engaged by a trip lever 46 with respect to which the spindle is freely rotatable, this trip lever being journaled at its inner end upon a rod 47 and having an inward extension 48 which when depressed by the finger cam 49 of the rotatable trip shaft 38, raises the spindle 42 from the lower active position of Figs. 1 and 2 to the inactive position of Fig. 3. The extension 48 of the trip lever 46 is also engaged by the inner end of a controlling lever 50, the latter journaled on a rod 51 and having upon its outer end an adjustable weight 52 so that when the finger cam 49 passes the extension of the trip lever, the weighted controlling arm or lever 50 acts on the trip lever to again lower the spindle into active position under tension of the adjustable weight 52.

On the cam shaft 31 below each spindle 42 is a spiral cam 53 having a cam rib adapted to intermittently act upon a rotating feed member or nut holder 54, the latter having depending roller mounted stems 55 at spaced points around its edge equaling in number and corresponding to its several vertical bores 56, the latter of which are shaped to receive and hold the nuts to be operated upon, and appear hexagonal in the present illustration as for instance shown in Figure 5. The several bores 56 are grouped around the axis of the rotating feed member the latter of which is rotatable on an upright stem 57 the lower end of which is fixed in the forward portion of a bracket 58, and depends through a disk 59 having thereon a renewable wear plate 60 on which the feed plate or table 54 rests. Disk 59 and its renewable wear plate 60 are cut away at one side as at 61 in Figure 8, above the chambered upper portion 62 of bracket 58, the base of which chambered portion slopes downwardly and rearwardly to a nut discharge chute 63 opening above the nut receiving tray 11 before mentioned.

The bracket 58 is vertically adjustably connected to the front plate 13 of the upright by means of an adjusting bolt 64 and clamping bolts 65 so as to adjust the rotating feed table 54 with respect to the lower counterboring tool 43 of the spindle 42, and the feed table 54 is vertically yieldable on the stem 57 by virtue of a spring 66 around the upper portion of the stem 57, held by adjusting nuts 67 and engaging the upper portion of the hub 68 of said feed table.

Thus in operation nuts placed within the nut holding bores 56 of the feed table 54 at the front of the machine and while the feed table is stationary, are advanced successively to the rear during rotation of the feed table under actuation of the constantly rotating spiral cam 53. The parts are so timed that during each period of rotation of the feed table the respective spindle 42 will be in uppermost position with the actuating finger cam 49 in operation as seen in Figure 3 and this timing is by virtue of the gearing connections through the inclined shaft 35 between the cam shaft 31 and the trip shaft 38. Each time the feed table 54 comes to rest with one of its nut holding bores 56 in vertical line beneath the spindle 42, the latter lowers into active position and its constant rotation causes it to immediately proceed with the cutting of the counterbore at one end of the nut, into which it advances until the finger cam again lifts the spindle and the feed table is again partially rotated.

It will be noted that during this operation the nut rests upon the renewable plate 60 above its supporting disk 59 and it is obvious from an inspection of Figures 5, 6 and 8 in particular that after being acted upon each nut is shifted, during rotation of the feed table, to a point above the cutaway portion 61 of plate 60 and disk 59. At this point the nut is free to drop through the respective bore 56 and through the cutaway portion 61 into the chambered upper portion 62 of the bracket 58 upon the base of which chambered portion 62 the nut slides downwardly to the discharge chute 63 through which it falls into the tray 11.

By virtue of the possible multiplication of the spindles and feed tables, as well as the character of the work, it is obviously quite possible that in operation careless placement of nuts will result at times in the falling of nuts between the feed tables causing a binding of the parts which would except in the event of some relief bring about serious results. It is for this reason that I provide the frictionally held gear 27 so that in the above or other dangerous situation this gear may simply slip on the worm shaft until the obstruction or obstructions are removed.

It is also to be observed that in view of the fact that the nuts in the bores of the feed table slide upon the upper face of the renewable plate 60, imperfect nuts may at times catch and bind although I have provided for relief in this event by allowing the feed table to yield vertically against the tension of spring 66.

Thus it is obvious that while generally of a simple inexpensive construction, the machine as provided by my invention will effectively and efficiently carry out the objects of the invention and will be strong, durable and automatic in its action.

I claim:

1. In combination with a rotatable nut supporting feed table, a rotatable and vertically shiftable spindle having a counterboring tool and beneath which the nut holding means of the feed table are successively shiftable, means in rotatable connection with

the spindle for shifting the same vertically, including a shifting lever, adjustable weight controlled means engaging the lever for thrusting the spindle downwardly, a tripping cam engageable with the lever for raising the spindle, and gearing connections between the tripping cam and the feed table rotating means as described.

2. A machine for counterboring nuts including a horizontally disposed rotatable feed table having nut holding means and provided with depending pins, a cam shaft beneath the feed table, a cam on the said shaft successively engageable with the said pins to intermittently rotate the feed table, a rotatable and vertically shiftable spindle above the feed table and beneath which the nut holding means of the feed table are successively movable, means to continuously rotate the spindle, a lever having a rotatable connection with the spindle for controlling its vertical position, means engaging the lever to hold the spindle in lowermost position, tripping means also engaging the lever for elevating the spindle, and gearing connections between the said cam shaft and the tripping means whereby to render the latter active during each rotative movement of the feed table.

3. A machine for counterboring nuts comprising a rotatable nut holding feed table, connections for imparting intermittent rotation to the feed table, a rotatable and vertically adjustable spindle above the feed table having a counterboring tool, means for continuously rotating the said spindle, means for raising the spindle, said latter means being connected to and operating in timed relation with the feed table rotating means, and driving connections for the feed table rotating means and the spindle raising means including a frictionally supported gear yieldable upon obstruction to the rotation of the feed table whereby to avoid breakage of parts as described.

4. In a machine of the character described, a rotatable and vertically shiftable spindle, an intermittently rotating feed table below the spindle having an annular series of nut holding bores, a vertical stem on which the feed table is rotatable, means to intermittently rotate the feed table, and a support for the feed table including a plate beneath and upon which the feed table rests, which forms a support for nuts within the bores to the feed table and is cut away at one point to permit nuts to drop through the bores, said feed table being yieldable vertically on the stem away from the nut supporting plate for the purpose described.

In testimony whereof I have affixed my signature.

HARRISON M. BRIGHTMAN.