June 10, 1930. R. E. MANLEY 1,762,872

BRAKE BAND DRILLING AND COUNTERSINKING MACHINE

Filed July 1, 1924 3 Sheets-Sheet 1

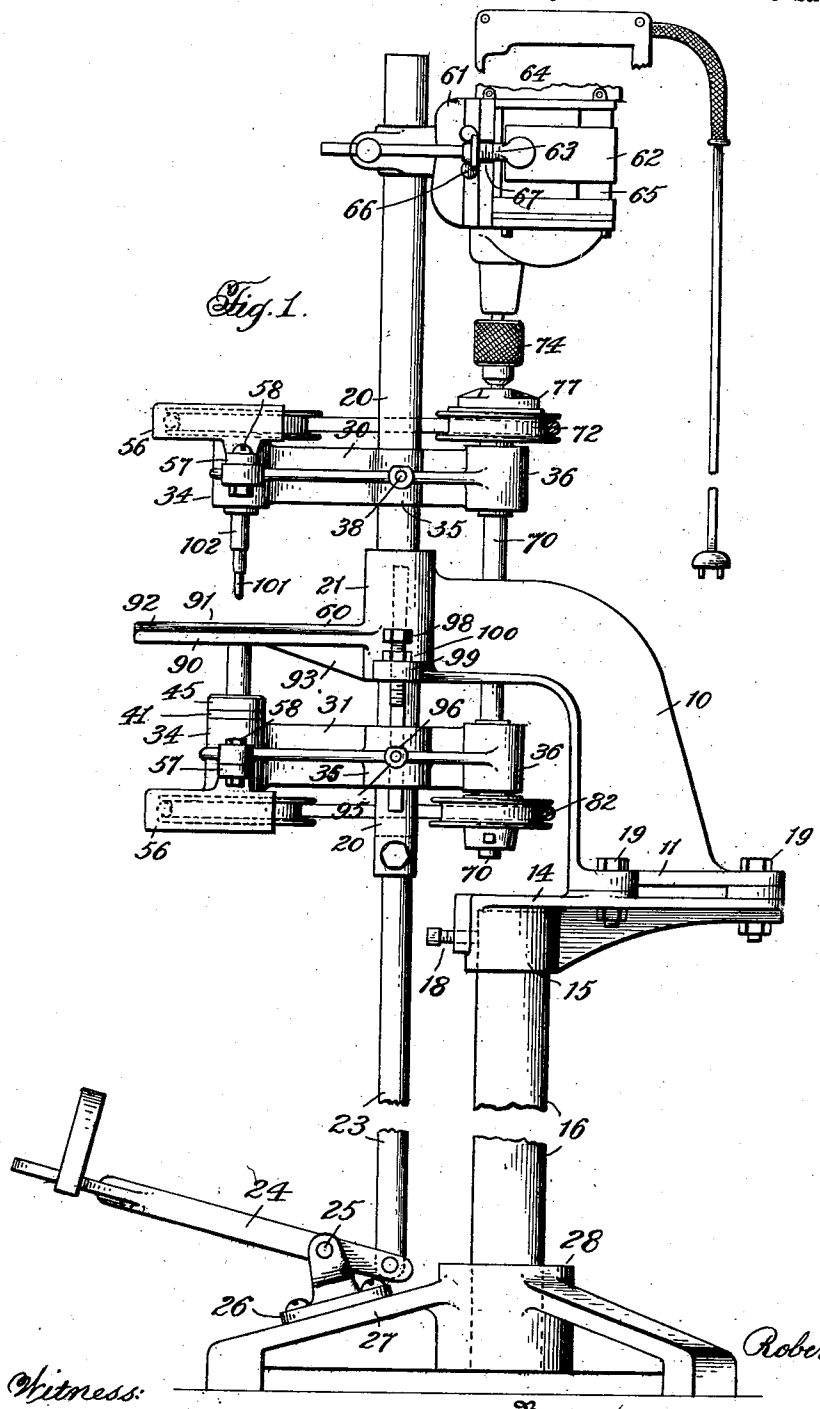


Fig. 1.

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Filed July 1, 1924 3 Sheets-Sheet 2

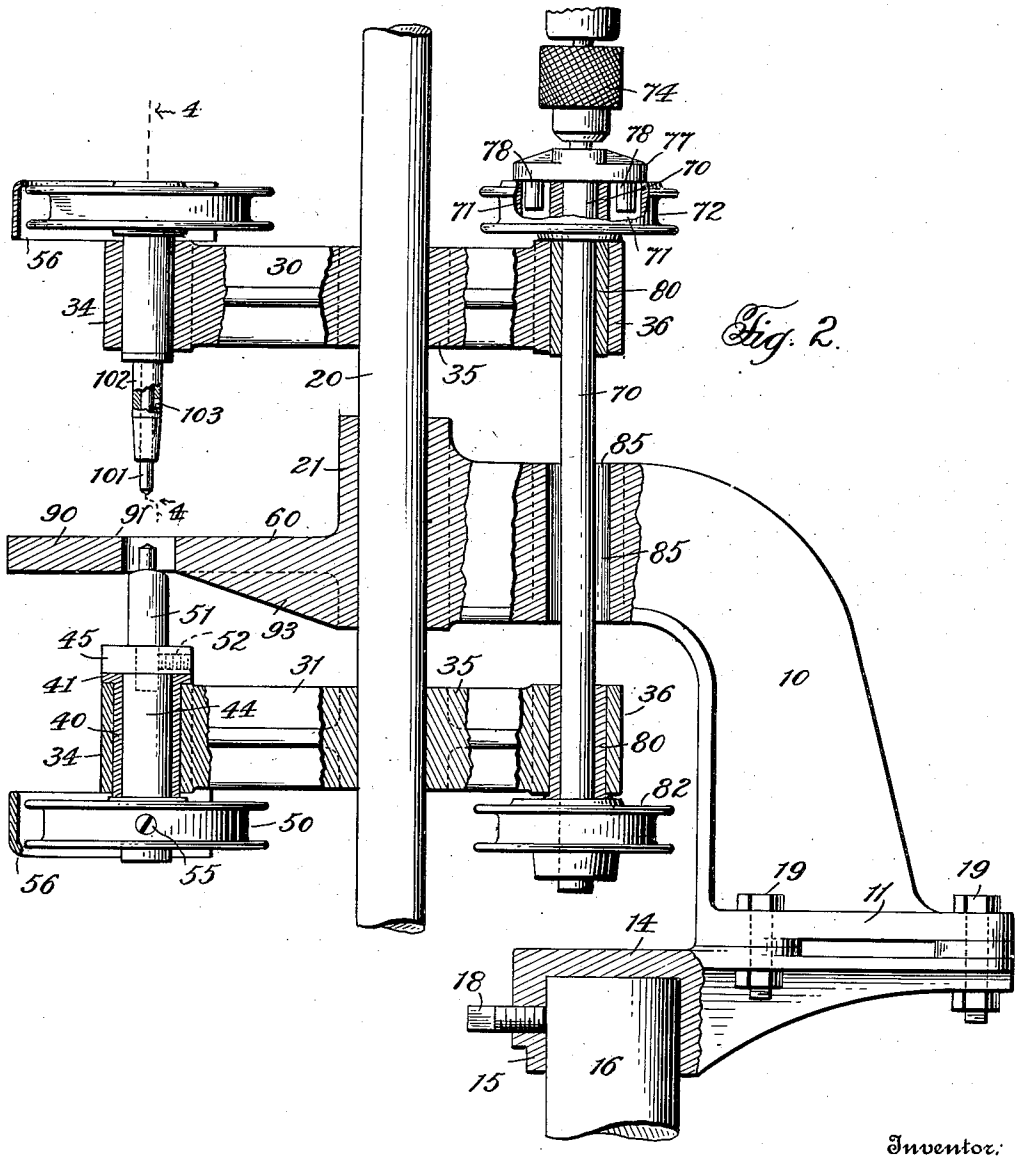


Fig. 2.

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BRAKE BAND DRILLING AND COUNTERSINKING MACHINE

Filed July 1, 1924 3 Sheets-Sheet 3

Fig. 3.

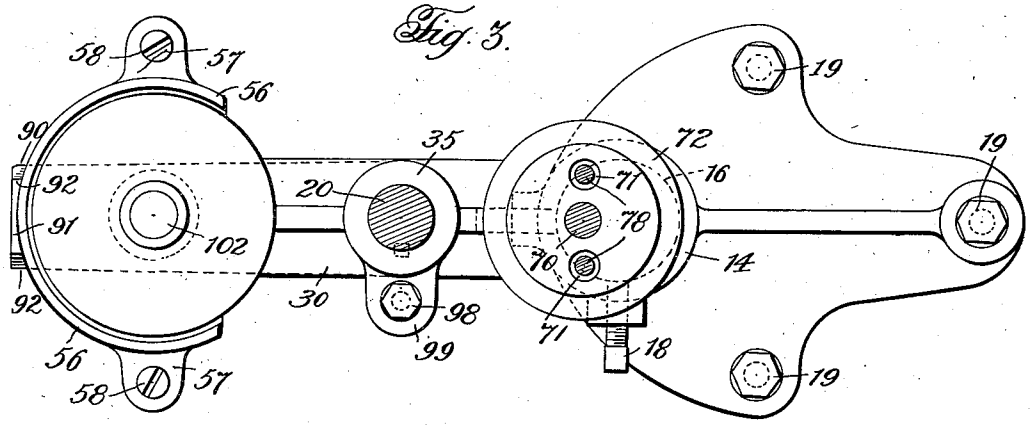
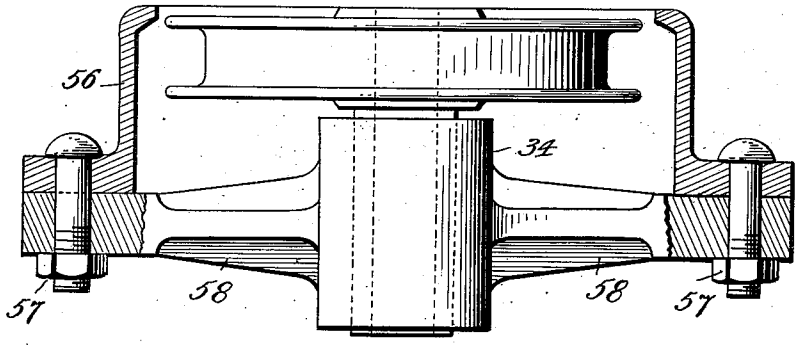


Fig. 4.



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UNITED STATES PATENT OFFICE

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BRAKE-BAND DRILLING AND COUNTERSINKING MACHINE

Application filed July 1, 1924. Serial No. 723,585.

This invention relates to a device for readily and conveniently drilling brake band linings for the reception of the usual rivets and for countersinking the lining material, and has for its principal object the provision of a simple and efficient machine for carrying out this purpose.

A further and important object of the present invention is the provision of a drilling machine of the type specified in which the drilling and the countersinking are done independently of one another, thereby making a very superior job by producing cleaner holes in the brake lining in both the small hole and the larger hole.

A still further object of the present invention is the provision of a device of this nature capable of quickly and easily drilling brake bands of small diameter.

Other and further objects of the present invention will be apparent from the description following and are particularly set forth in the claims.

In the drawings:

Figure 1 is a side elevation showing the entire device.

Figure 2 is a similar view, partly in section, but on a larger scale and showing only the central portion of the machine.

Figure 3 is a top plan view with the electric motor removed.

Figure 4 is a section taken on line 4—4 of Figure 2.

What may be termed the main frame of the machine is actually a bracket numbered 10 in the drawings and having a base 11 which is ordinarily fastened to a bench in some desired manner, but in the preferred form shown in Figure 1 I have shown the base 11 as bolted to a small cap casting 14 having an integral socket 15 receiving a tubular post 16, permanently or detachably secured to the cap casting 14. While the post 16 will often be threaded into the casting 14, it may be detachably secured by means of the set screws 18 as shown if so desired, it being much easier to loosen these set screws than to remove the bolts 19 which secure the casting 14 to the base 11 of the bracket 10.

The shaft 20 is nonrotatable but slidably mounted in a central bearing 21 integral with the bracket 10, and the shaft 20 is free to reciprocate therein, being connected by means of a link 23 with a foot lever 24 pivoted as at 25 to a small bracket 26 fastened directly to the floor in case the device is screwed to a work bench, or as in the preferred showing of Figure 1 the bracket may be secured to one of the legs 27 of a relatively heavy base to which is firmly secured the post 16, the base 28 therefore supporting the entire mechanism. This is the preferred form, and it is very convenient in small garages as the device is not particularly heavy and can be transported with ease from place to place where most convenient to use, the device, as will hereinafter be more fully explained, being entirely self-contained.

On the shaft 20 are two frames numbered 30 and 31, preferably for manufacturing reasons exactly alike, that is they are made from one casting, but in use, as will be noted, reversed. Each of the frames consists of three bearings, a drill bearing 34, a center bearing 35 and a pulley bearing 36. The two outer bearings have bushings to receive rotatable shafts while the center bearing 35 requires no bushing as it smoothly engages the shaft 20 and is locked thereon by means of a fastening of preferred kind, here consisting of a pin 38 extending entirely through the frame and the reciprocating supporting shaft 20 here shown as cylindrical, this being a less expensive form for manufacture, even though it requires a keyway to prevent the shaft 20 from rotating with respect to the bracket 10. Except for the cost of manufacturing, I prefer to use a nonround shaft 20, a square cross section, for example.

In Figure 2 I have shown the left-hand side of the lower frame 31 in cross section more clearly to illustrate the configuration of the bushings which I use to lessen the cost of manufacture of the device. The drill bearing 34 of the lower frame 31 has a smooth but not machined cylindrical bore and into this bore I drive the bushing 40 consisting in addition to the usual hollow

cylinder or sleeve, an integral annular flange 41 having its periphery aligned with the circular edge of the boss of the bearing 34. Countersink shaft 44 rotates within the sleeve of the bushing and has an enlarged head 45 resting against the top of annular flange 41 of the bushing, which, as will be noted, extends below the lower edge of the bearing 34, the bushing at this point being in engagement with the hub of the pulley 50, a small annular portion of the top surface of which is machined. By virtue of this arrangement all machining of the frame is avoided, the rotating, frictional surfaces being limited to the smaller portion of the pulley engaging the bottom of the bearing and that portion of the drill or countersink shaft which engages the bushing. The countersink 51 is screwed in the enlarged portion 45 of the shaft by means of a set screw 52 to facilitate quick and easy replacement of the countersink. The pulley 50 is secured to the countersink shaft 44 in any desired manner as for example by the screw 55 and the pulley is protected preferably by means of a guard 56 bolted as at 57 to a short bracket 58 integral with the drill or countersink bearing 34. It will be noticed from Figure 1 that the two guards 56 extend only on the front portion of the pulleys, the horn 60 being considered the front of the machine, as it is the portion of the machine which the operator faces when working the drill.

In order to have the device self-contained and portable, I secure to the post 20 a yoke 61 into the slotted arms of which I secure the nuts of an adjustable band 62 to each end of which I rivet a bolt 63 preferably fitted with the wing nuts as shown in order to facilitate ready and convenient detachment of the band and of the motor drill 64 carried thereby. This motor drill is of standard type and has a hexagonal central body portion 65 fitting nicely in the correspondingly angled V of the yoke. While the yoke may be adjusted up and down on the post no such adjustment is actually used in practice after the drill is once fitted, and to release the motor drill it is only necessary to unfasten one of the wing nuts 66 sufficiently to allow its bolt 63 to slip out of the slot 67 in the arm of the yoke.

While theoretically it is possible to arrange the axis of the motor coaxially with the axis of the primary shaft 70, this is extremely difficult in practice, and for this reason I provide a plurality of recesses 71 in the pulley 72 at the top of this shaft 70, and I secure to the clutch 74 of the motor a disk-like member 77 having a plurality of lugs 78, each fitting loosely in one of the recesses 71 so that the disk-like member 77 and the pulley 72 form in effect a universal joint which has proven extremely useful in practice.

The bushings 80 in the rear bearing 36 of the two frames are exactly similar to the bushing 40, the flange of each engaging the proximate pulley 72 or 82. As shown in Figure 2, the primary shaft, which is directly coupled to the source of power here shown as an electric motor drill, but which may be any other source of power driving the shaft in any way, reciprocated loosely in the bracket 10, the hole 85 in the bracket being sufficiently large to avoid any contact between the shaft 70 and the bracket.

The forward end of the bracket 10, preferably an integral piece, is a horn or bed 60 preferably having a plane top surface 91 centrally thereof and sloping sides 92 merging therewith, the sides 92 being either curved or plane as may be desired, but in either event I prefer that there shall be no sharp line of demarcation between the central plane portion of 91 and the two sloping portions. The horn may be relatively narrow and is strengthened by a small triangular rib 92 also integral with the central bearing 21 and the rest of the bracket. Each of the frames carries a lateral outstanding lug 95 having a flat portion 96 to engage an adjustable stop screw 98 in threaded engagement with a lug 99 projecting laterally from the central bracket bearing 21 and locked in place thereon by means of a lock-nut 100, thereby to limit the upward movement of the lower frame 31 to insure that the countersink 51 may penetrate the lining to the exact depth necessary to accommodate the rivet head.

The drill bit 101 is detachably secured in a socket in the drill shaft 102 and held therein by the set screw 103, the general formation of the upper drill and its associated parts being substantially similar to that of the lower drill or countersink.

The operation of the device is extremely simple and has proven most efficient in practice. The foot pedal or lever 24 is depressed, raising the drill bit 101 above the horn or bed 60 and not raising the countersink or its drill bit above the upper surface of the horn. This leaves a free space between the drill bit 101 and the horn sufficient to permit free and easy adjustment of the brake band in position for entry of the drill 101 which, as will be noted, serves as an indicating guide and obviates the use of the customary two guides common in prior art wherein the drill and countersink work simultaneously from beneath. The brake band is pressed down by the operator on the horn and the lever 24 is released. The weight of the parts causes the combined assembly of motor 64, frames 30 and 31, pulleys and their bands as well as primary shaft 70 and link 23 to descend by gravity,

drilling a hole in the brake band lining of the size of the hole in the brake band itself. The lever is again depressed raising these movable parts against gravity and during this motion the countersink 51 and its drill pass through the opening 110 in the horn and countersink the lining to the amount permitted by the adjustment of the stop 98.

What I claim is:

1. In a brake band drill, a narrow horn for supporting a brake band held against the upper surface of the horn by the operator, a vertical shaft passing thru said support adjacent said horn, means on said shaft working from above said horn for making a hole in the brake band lining, and means on said shaft working from below said supporting means for making a hole in the lining, one of said holes passing entirely through the lining and the other hole being of larger diameter and not passing through the lining, both holes being concentric and made without removal of the brake band from the horn, and means for shifting said shaft for operating said working means as a unit.

2. In a device of the character described, a main frame, a vertical shaft mounted therein, a prime mover, a drill and a countersink each carried by said shaft and each having its axis parallel to the axis of said shaft and held against axial movement, with respect thereto, power transmitting mechanism operatively connecting said prime mover and said countersink and entirely carried by said shaft, and means for preventing rotation of said shaft in said main frame.

3. In a brake band drilling machine, a main frame, a vertical shaft slidably and non-rotatably mounted in said main frame, a pair of parallel cross bars secured to said shaft, a drill rotatably mounted at the end of one of said cross bars, a countersink rotatably mounted at one end of the other cross bar and in axial alinement with said drill, means carried by both cross bars for driving said drill and said countersink, a work support located between said drill and countersink and means for causing relative movement of said shaft and said work support.

4. In a device for drilling small circular bodies such as brake bands, a frame, a work support, having a perforation therein, a shaft movable in a direction at right angles to said work support, a pair of arms extending from the shaft in the direction of said perforation, a drill mounted in one of said arms, a tool mounted in the other of said arms, said drill and said tool being coaxial and alined with said perforation so that either can pass thru the perforation, and means carried by said shaft for driving the drill and the tool, said means including a pulley on each arm, said pulleys being coaxial and the distance between the drill and its pulley being substantially equal to the distance between the tool and its pulley so that a small circular body can be drilled from above or below with equal facility.

5. In a brake band drilling machine, a main frame including a brake band supporting horn, a vertical shaft slidably mounted in said frame adjacent said horn, cross arms on said shaft, drills in said cross arms above and below said support and means on said cross arms opposite said drills for driving said drills, and a foot treadle for raising the shaft and the thereby carried drills and drill driving means.

6. In a brake band drilling machine, a frame including a perforated brake band supporting horn, a shaft vertically slidable in said frame, a pair of cross arms centrally secured to said vertical shaft, drilling means including a drill and pulley rotatably mounted at the free end of one of said arms, countersinking means including a countersink and pulley mounted at the free end of the other of said arms, one of said means being above the horn and the other means being below the horn and both means being coaxial, their axes passing thru the horn, a drive shaft mounted in the opposite ends of both of the cross arms, means carried by said vertical shaft for driving the drive shaft and parallel belting connecting the two pulleys on the drive shaft with the pulleys on the drilling and countersinking means respectively, and means for causing relative movement between the frame and horn on one hand and the drilling countersinking and drive means on the other hand.

7. In a device of the character described, a work support positioned a fixed distance above the floor, a drill, an opposed countersink, a prime mover, means connecting the prime mover with the drill and with the countersink, and a single means supporting all of said elements except the work support so that these elements move as a unit toward and away from the floor during the operative cycle.

8. The device of claim 7 in which the work support is a narrow horn against which a brake band may be held by the operator, and the single means is a non-rotatable shaft which may be reciprocated by the foot of the operator while he holds the brake band against the work support.

9. The device of claim 7 in which the work support is a narrow horn against the top of which an operator may position and hold a brake band using the drill for a guide to position the band, the single supporting means lies between the prime mover and the drill and in which the connecting means are endless belts lying in horizontal planes.

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