

March 15, 1927.

M. B. WILDER

1,620,848

DRILLING AND COUNTERSINKING TOOL

Filed April 13, 1925

Fig. 1.

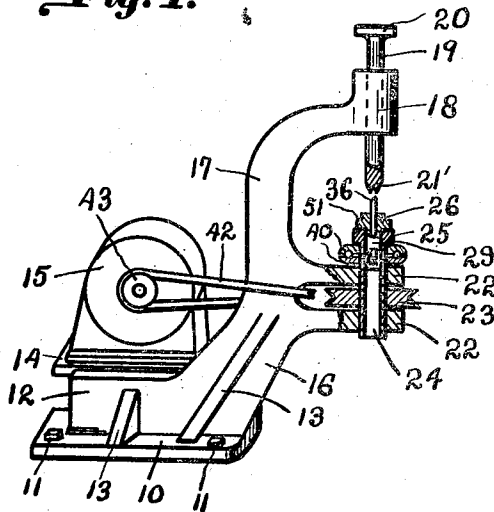


Fig. 2.

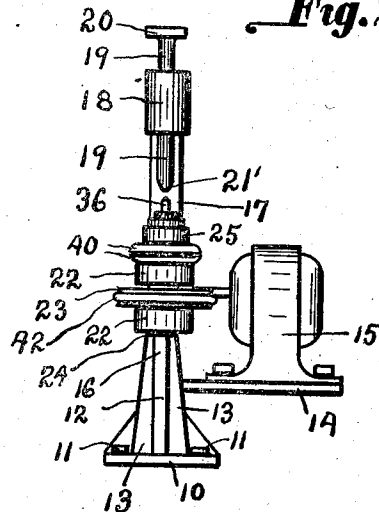


Fig. 3.

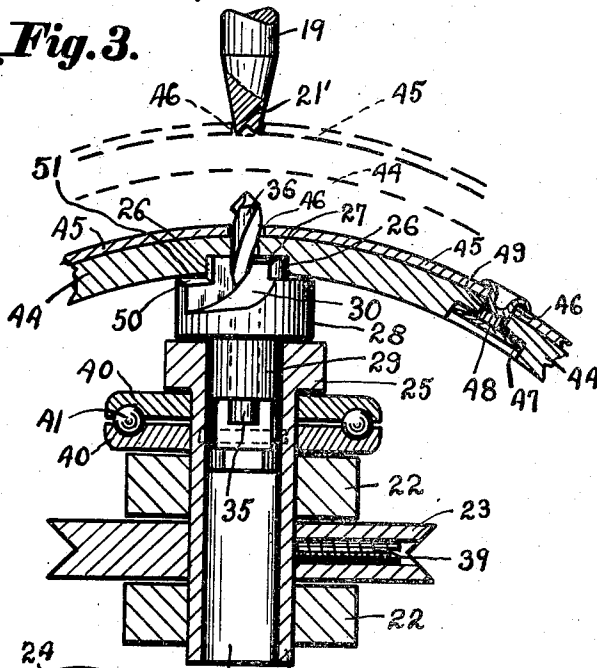


Fig. 4.

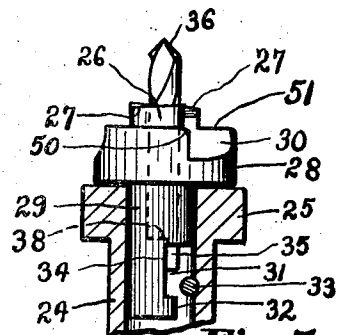
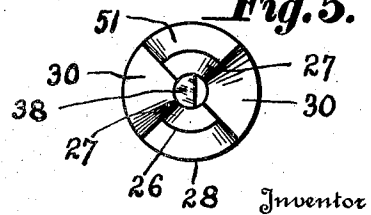


Fig. 5.



Inventor

Fig. 7.

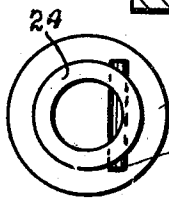
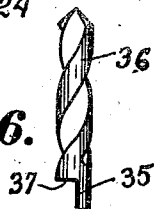


Fig. 6.



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UNITED STATES PATENT OFFICE.

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DRILLING AND COUNTERSINKING TOOL.

Application filed April 13, 1925. Serial No. 22,620.

The present invention relates to drilling and countersinking machines.

An object of this invention is to provide an improved machine for relining brake bands and the like and for all classes of work requiring drilling and countersinking, and provides a machine wherein the two operations may be combined in one operation and wherein the alinement and the depth of counter sink may be gaged both with respect to the hole drilled and the counter sink as well as the register of the drilled hole with punched or other prior formed apertures in different portions of the work.

Another object of the invention is to provide a novel combination of elements of the machine of this character for use particularly in the relining of brake bands to reduce the number of operations thereon and to obtain greater accuracy in the register of the drilling of the openings in the brake band lining with those which occur in the brake band itself.

A further object of the invention is to provide a novel type of rotatable chuck and a novel construction of tool for cooperation with the chuck to accomplish the above set forth purposes.

A still further object of the invention is to improve the general construction of this type of machine for drilling a countersink and to provide a tool or member which combines a removable or interchangeable drill point with a countersinking element whereby the breakage of the drill point will obviate the necessity of discarding the entire tool, and to provide a novel construction of drill point which may be made from drills of ordinary construction, so that the ordinary type of drill when broken and useless for general purposes may be machined with little labor to interfit with the countersinking member or element to provide the combined tool.

A primary object of the invention is to improve the construction of a countersinking and drilling tool in a manner whereby means is provided for limiting the depth of the countersink, said means to be such that in use the work will not become torn, bruised, abraded or injured.

The invention further aims at the elimination of set screws and the like for locking the drill and countersinking member to chucks and other parts of the machine, and to provide a machine of few and simply con-

structed parts which are economical to manufacture and easy to install or set up and operate.

With the foregoing and other objects in view, the invention will be more fully described hereinafter and will be more particularly pointed out in the claim appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a side elevation partly in section of a combined drilling and countersinking machine constructed according to the present invention.

Figure 2 is an outer end elevation of the same.

Figure 3 is a fragmentary enlarged vertical section taken through the chuck portion of the machine and showing a brake band with its lining applied to the machine, the dotted lines showing the initial positions of the brake band and its lining.

Figure 4 is a fragmentary sectional view taken through the chuck and the improved tool mounted therein, the view being taken substantially at right angles to the showing in Figure 3.

Figure 5 is a detail top plan view of the countersinking member of the tool.

Figure 6 is a detail side elevation of the removable drill or bit of the tool, and

Figure 7 is a bottom plan view of the chuck with its locking pin therein.

Referring to the drawing, and first to Figures 1 and 2 in particular wherein is shown a complete machine for drilling and countersinking holes in brake bands and embodying the novel features of this invention, 10 designates a base plate of suitable proportions and configuration for attachment to a table or support by means of lag screws 11 or the like, and which is provided longitudinally and between its lateral edges with an upstanding web portion 12 suitably reinforced by the lateral braces or fins 13. The web 12 carries a horizontal table or support 14 which extends to one side of the machine as best shown in Figure 2 and is adapted to carry a motor 15 of the electric or other suitable type for operating the machine.

The forward end of the web 12 is provided with an outwardly and upwardly extending neck portion 16 which terminates in a substantially C-shaped head 17 the upper over-

hanging portion of which terminates in a vertical bearing sleeve 18 in which is slidably mounted for vertical movement a pilot rod 19 having a suitable head 20 and provided with a tapering and recessed lower end 21' adapted to enter openings punched or otherwise formed in the steel brake band for centering the latter.

The lower portion of the head 17 is provided with a pair of vertically spaced apart arms 22 between which is rotatably mounted a drive pulley 23, the latter being fixed upon a hollow chuck 24 which has bearing at opposite ends in the arms 22 and which extends upwardly beyond the arms and is provided on its upper end with an outwardly flanged head 25.

Referring now more particularly to Figures 3 to 7 inclusive, the hollow chuck is adapted to receive in its upper end the combination countersinking and drilling tool forming a part of this invention, and this tool includes a pair of opposed, segmental projections or cutting-blades 26 having inclined, flat surfaces 27, said blades 26 performing the operation of countersinking. The inclination of each surface 27 is uniform and receding toward the distal end of the tool from the blades 26, said blades or projections during operation moving in advance of the inclined surfaces, it being understood that the rotation of the tool is reverse to a clockwise movement. This construction is of great advantage in countersinking various kinds of material used for the linings since "clean cuts" are made and abrasions and roughening of the material are avoided. These countersinking projections 26 are formed upon the outer face of an enlarged head 28 which, is adapted to rest upon the head 25 of the chuck, the head 28 of the countersinking member having a hollow shank 29 adapted to snugly fit in the opening 21 of the hollow chuck 24. The head 28 of the countersinking member is recessed in opposite sides and the recess in each side has an inclined outwardly deflecting face 30 which recedes inwardly from the inclined surface 27 and is curved rearwardly from the direction in which the tool is adapted to operate.

The shank 29 of the countersinking member is provided in one side and in spaced relation to its lower end with a transverse recess 31, and also has a flattened face 32 in the same side and at its lower end for the purpose of permitting the shank 29 to be inserted and withdrawn from the chuck 21 when adjusted therein to escape a transverse locking pin 33 which is secured through one side of the chuck 21 and in such position as to intersect the bore or opening through the shank 21. This arrangement is shown particularly in Figures 4 to 7, and it will be seen that, when the shank 29 is turned in

the chuck 21 the flat face 32 is moved at one end into position beneath the pin 33 and forms a shoulder or projection to prevent the pulling upwardly of the countersinking member; such as when the brake band with its lining is pulled from the tool after the drilling operation. The transverse recess or opening 31 in the shank 29 provides a flat face 34 against which is adapted to seat the lower flat projecting lug 35 which is formed upon the inner end of the drill bit 36. The inner end of the drill bit 36, above the projection 35 terminates in a flat shoulder 37 which is adapted to seat upon a correspondingly formed shoulder 38 provided in the shank 29 at the top of the flat face 34 as clearly shown in Figures 4 and 5. The projection 35 of the drill bit 36 is adapted to hold the drill bit from turning in the countersinking member, and the pin 33 is adapted to hold the countersinking member from turning beyond a predetermined extent in the hollow chuck 21. The pulley 23 may be removably secured to the chuck 21 by a set screw 39 or the like as shown in Figure 3 so that the various interfitting parts may be turned as a unit by the pulley 23 and at the same time set screws and other devices usually employed in connection with chucks, bits and the like are eliminated and positive connecting means is provided which are readily releasable when the parts are moved in directions opposite to that in which they normally operate.

For the purpose of supporting the chuck 24 and the tool, and for taking up thrust of the pilot rod 19 and other pressure exerted downwardly upon the tool when in operation, an anti-friction bearing support is provided in the form of a pair of discs or plates 40 provided with annular race ways in their opposite faces adapted to receive ball bearings 41 or the like to permit of the free turning of the discs one upon the other and to take up frictional contact between the relatively movable parts.

The motor 15 is connected to the pulley 23 by a belt 42 or the like which is trained over a pulley 43 carried by the motor 15, or any other suitable driving means may be resorted to.

In the use of the improved machine the lining 44 is placed against the inner side of the brake band 45, the lining falling away from the brake band 45 as shown in dotted lines in Figure 3 until the pilot rod 19 is forced downwardly against the brake band 45 with its tapering point 21' fitted in the opening 46 of the brake band. As the pilot rod 19 is borne down toward the combined drilling and countersinking tool, the parts are forced together and, as the upper end lower portions of the head 17 are in coaxial and vertical alignment, the band 45 has its opening 46 brought and maintained in

proper register with the drill bit 36, so that as the chuck 24 with its parts is rotated the lining will be apertured in true coaxial alignment with the opening 46 in the brake band, and the countersink about the aperture in the lining 44 will be truly concentric with respect to the aperture. It will be understood that brake lining is composed of rough surfaced material which is easily bruised and that the shoulder 51, which is at substantially a right angle with respect to the side wall 26 of the improved tool, functions as a stop for limiting the depth of the countersink 47 in a manner whereby the material is not injured, by means of beveled or inclined facets 50 as later explained. It will be noted that the shoulder 51 is at substantially a right angle with respect to the side wall 26 of the improved tool, and thus functions as a stop for limiting the depth of the countersink 47. Various tools may be provided with countersinking projections 26 of different depths and these tools may be quickly interchanged in the chuck 21 for brake linings of different thicknesses or sizes, and such interchange may be made simply by partially turning the shank 29 of the combined tool in the chuck 21, so as to move the face or projection 32 from beneath the pin 33, when the tool may be quickly drawn upwardly and a different one inserted. This same adjustment may also be effected with respect to the drill bit 36 as it may be quickly and easily removed upon breakage or where interchange is otherwise required. No adjustment of set screws or like devices is necessary and the entire machine may thus be operated with relative speed, and no great amount of care need be exercised in the interfitting or adjustment of the parts because as soon as the machine is set into operation the parts automatically become interlocked.

As shown in Figure 3 the lining 44 is provided with a countersink 47 in which the head 48 of a rivet may be seated while the shank 49 of the rivet passes through the outer portion of the lining 44 and then through the opening 46 of the brake band 45. The outer end of the rivet 49 is flanged or spread over against the outer surface of the brake band to hold the parts together.

The pin 33 engages the shoulder 32 and holds the shank 29 and the tool from lifting upwardly out of the chuck 21 when the brake lining with its band is pulled upwardly to release the same from the machine. The recesses and inclined faces 30 in the opposite sides of the head 28 of the countersinking tool are provided for the purpose of carrying and throwing off the chips or fragments which are cut from the lining 44 dur-

ing the countersinking operation, these fragments are thrown outwardly and away from the drill and the counterbore as the inclined faces 30 not only slope backwardly with respect to the direction of rotation of the tool, but also slope inwardly from the axial or central portion of the tool.

In the operation of countersinking, the projections 26 move into the lining until the outer end of the head engages the concave side of the lining and at that time the tool will be rotating. In order that the lining will not become cut or injured by the revoluble movement of the head 28 a pair of inclined facets 50 are formed in the top of the head, the inclination of each facet being toward a recess 30. It will be noted that the tool rotates in a counterclockwise direction when looking down upon the tool from above and, as shown in Figure 4, the tool is rotated towards the right thus bringing the inclined facets 50 first into contact with the rough lining. On account of the inclined surfaces or facets 50 of the shoulder 51 the lining is guided or gradually pressed upward into contact with the horizontal portion of the shoulder 51, and an account of this construction and operation injury to the lining is avoided.

I do not wish to be restricted to the size, form, and proportions of the various parts, and obviously changes could be made in the construction herein described without departing from the spirit of the invention, it being only necessary that such changes fall within the scope of the appended claim.

What is claimed is:—

A drilling and countersinking tool for use with a chuck having a cross pin, comprising a countersinking member having a head and a shank on the inner end of the head for seating in a chuck, said head having countersinking projections on its outer end and provided with an axial opening extending inwardly through said projections, head and shank, said shank having a deep recess in one side to receive the cross pin of the chuck and intersecting the opening at its upper end to provide a flat face in the recess and a shoulder at the top of the flat face comprising the bottom of said axial opening, and a drill bit removably fitting in the axial opening and engaging said seat at its inner end, said drill bit having a projection at one side adapted to engage the flat face of said shoulder to hold the drill bit from turning in the countersinking member.

In testimony whereof, I have affixed my signature.

MORRIS B. WILDER.