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G. B. CADY

MACHINE FOR COUNTERBORING BRAKE LININGS AND THE LIKE

Filed April 10, 1925

Fig. 1.

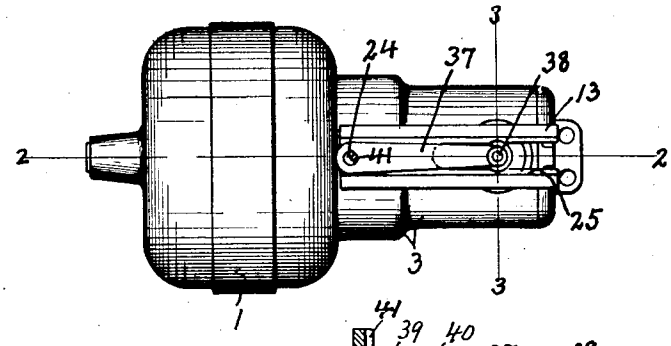


Fig. 2.

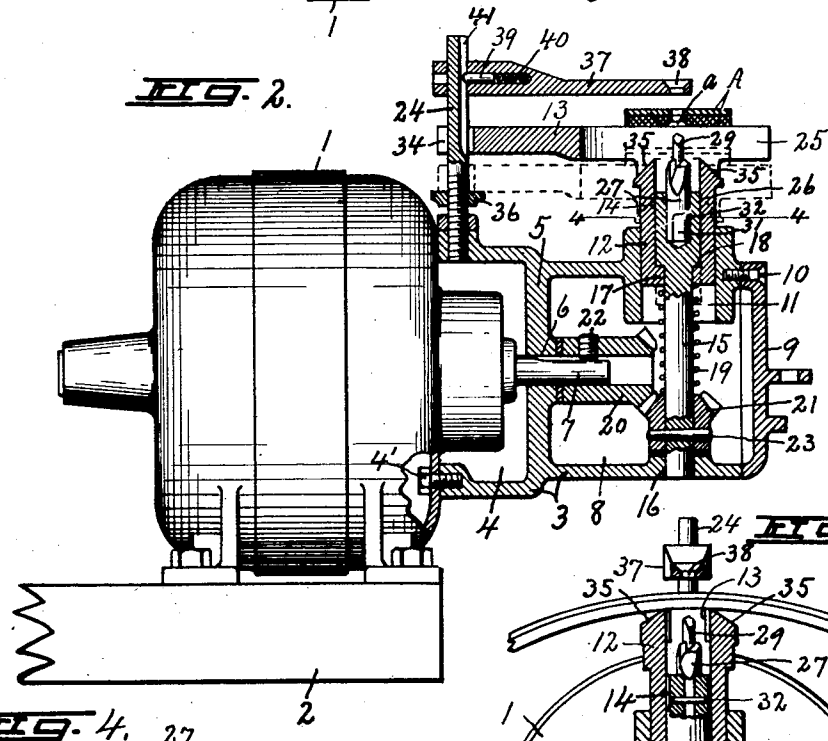


Fig. 3.

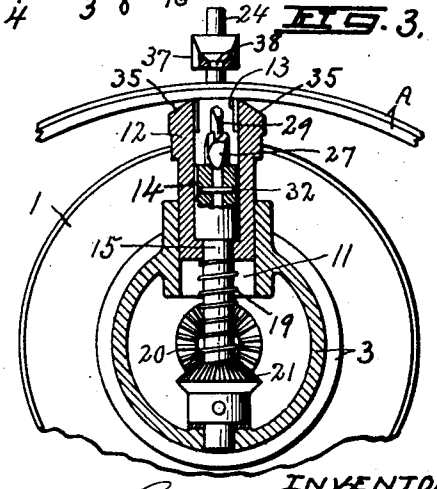


Fig. 4.

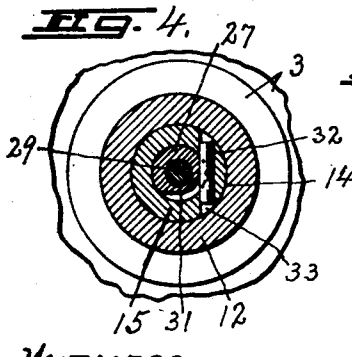
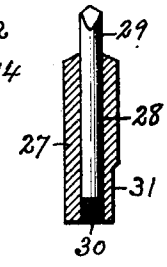


Fig. 5.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR COUNTERBORING BRAKE LININGS AND THE LIKE.

Application filed April 10, 1925. Serial No. 22,099.

This invention relates to a machine for drilling and counterboring brake band linings in which the metallic section of the brake band has been previously drilled at suitable intervals for receiving rivets by which the lining may be properly secured to the metallic section while the linings, particularly in replacements, must be drilled and counter-sunk to correspond with the rivet holes in the metallic section.

The drilling and counter-boring tool is preferably driven by an electric motor and for convenience of installation and economy in space the frame of the machine is preferably mounted directly upon the frame of the motor in such manner as to form a unitary structure therewith.

The brake bands are usually circular and of widely varying diameters and the main object of my present invention is to attach the frame of the machine to the frame of the motor in such manner that the brake bands of varying diameters may be operated upon with equal facility.

In other words, I have sought to leave a clear open space beneath the drill-supporting frame so that bands of different sizes may be adjusted circumferentially across both ends of the drill spindle without in any way interfering with the motor, by arranging the motor in a horizontal position and fastening the drill frame to one end thereof with a drill spindle at right angles to the axis of the motor shaft and then fasten the motor near the edge of a work bench so that the drill frame may project beyond said edge.

Other objects and uses relating to specific parts of the machine will be brought out in the following description.

In the drawings:

Figure 1 is a top plan of the machine complete including the motor.

Figure 2 is an enlarged longitudinal vertical sectional view through the drill-supporting frame taken on lines 2—2, Figure 1, the motor being shown in side elevation.

Figure 3 is an enlarged transverse vertical sectional view taken in the plane of line 3—3, Figure 1, except that the lower portion of the motor is broken away.

Figure 4 is an enlarged horizontal sectional view taken in the plane of line 4—4, Figure 2.

Figure 5 is an enlarged vertical sectional view of the drill and counter-boring tool.

As illustrated, this machine comprises an electric motor —1— firmly secured to a suitable supporting bench or table —2— near the front edge thereof with its shaft extending horizontally and transversely of the bench and beyond the front edge thereof.

A drill-supporting frame —3— is rigidly secured by bolts —4— to the front of the frame of the motor —1— so as to project forwardly therefrom beyond the front edge of the bench —2— and at a plane above the upper surface thereof, the rear end of the frame being recessed at —4— for receiving the hub on the adjacent end of the motor and thereby to permit the frame to be brought into close proximity to the body of the motor frame for greater stability and reduction of vibration incidental to the operation of the motor and drill.

In other words, the main body of the frame —3— is supported between the bottom and top of the motor or nearly equal distances above and below the axis of the motor shaft, and is provided with an upright partition —5— having a journal bearing —6— for receiving a forward extension —7— of the motor shaft, said partition also forming the rear wall of a gear housing —8— having a removable front wall —9— normally held in place by screw bolts —10— thus forming an oil tight chamber for receiving the gears presently described, the top wall of the gear chamber —8— is provided with an upright guide opening —11— for receiving the hub —12— of a superposed work-supporting table —13— which together with its hub is movable vertically for moving the work thereon into and out of engagement with the drill and counter-boring tool, presently described, the hub —12— of the work table —13— is provided with a lengthwise opening —14— therethrough from top to bottom to form a journal bearing for the upper end of a rotary upright shaft —15— having its lower end journaled in a suitable bearing —16— in the bottom of the gear case.

The lower end of the opening —14— in the hub —12— is reduced in diameter to form an annular shoulder —17— while the upper end of the shaft —15— above the shoulder —17— is enlarged in diameter to form an annular shoulder —18— which cooperates with the annular shoulder —17— for limiting the upward movement of the work table which is normally spring-pressed

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upwardly by a coiled spring —19— surrounding the lower reduced portion of the shaft —15— as shown in Figure 2.

Rotary motion is transmitted from the extension —7— of the motor shaft to the upward drill shaft —15— through the medium of beveled gears —20— and —21—, the gear —20— being secured by a set screw —22— to the motor shaft —7— while the gear —21— is secured to the lower end of the upright shaft —15— by means of a key —23—.

The coiled spring —19— is interposed between the upper face of the gear —21— and lower end of the hub —12— to exert upward pressure against said hub and thereby to yieldingly hold the work table —13— in an elevated position with its upper face normally above the point of the drill.

The upper portion of the work table is disposed in a substantially horizontal plane at right angles to the axis of the upright shaft —15— and parallel with the motor shaft and extends rearwardly some distance beyond the hub —12— for sliding engagement with a stationary upright post —24— which is rigidly secured at its lower end to the upper side of the frame —3— near the front face of the motor —1—, the engagement of the work table with the post serving to hold said table against turning movement about the axis of the drill shaft or spindle —15— during the drilling and counter-boring operation.

The front portion of the work table —13— is provided with a slot —25— extending diametrically across the upper end of the hub —12— to permit the passage of the drill therethrough and into the work or brake band as —A— which is supported upon the upper face of the work table in a manner hereinafter described.

The upper enlarged end of the upright shaft or drill spindle —15— is provided with a central cylindrical lengthwise socket —26— open at the top for receiving a counter-boring tool —27— which, in turn, is provided with a central lengthwise socket —28— for receiving a drill —29—.

The drill —29— is tightly fitted in the socket —28— and is provided with a peripherally knurled or roughened portion —30— tightly pressed into the adjacent portion of the socket —28— to additionally hold the counter-boring tool and drill against relative rotary movement in operating upon the work.

The counter-boring tool —27— with the drill therein is removably mounted in the socket —26— so that the upper cutting faces of both the counter-boring tool and drill project some distance above the upper end of the shaft —15— but suitable provision is made for automatically tightening the tool in the socket —26— against undue rotation relatively to the shaft —15— when operating upon the work and for this purpose one side of the lower end of the tool —27— is recessed to form a cam face —31— and also to receive a tangent pin or key —32— which is passed through a tangential opening —33— in the adjacent portion of the shaft —15— so as to project into the recess and against the cam face —31— of the tool —27—.

This cam face is elongated circumferentially and extends to the lower end face of the tool —27— so as to permit the tool —27— to be withdrawn endwise upwardly from the upper end of the shaft —15— but when said tool is in operative position with its cam face —31— engaging the pin —32— the resistance to rotation of the tool by the shaft —15— due to the engagement of the tool with the work will cause the cam face to tightly wedge against the pin —32— to automatically lock said tool to the shaft —15— against relative rotation when operating upon the work.

The rear end of the work-supporting table —13— is slidably engaged with the upright post —24— to hold it against turning and for this purpose is provided with a slot —34— through which the post —24— extends, the upper end of the hub —12— of the work table being provided with beveled faces —35— to facilitate the clearance of the chips from the drilling or boring tools when operating upon the work.

An adjustable stop nut —36— is engaged with the threaded portion of the upright post —24— for limiting the downward movement of the work table —13— and thereby serves to limit the depth of the counter-sink as —*a*— in the lining of the brake band —A— by the counter-boring tool —27—.

Suitable means is provided for registering the holes in the metallic section of the band —A— with the drill —29— and counter-boring tool —27— and for this purpose a registering arm —37— is slidably mounted at one end upon the upper end of the post —24— to project laterally therefrom directly over the work table and diametrically across the upper end of the drill —29— and counter-boring tool —27—, the other end of said arm being provided with a sight opening —38— in axial alignment with the drill —29—, said arm being also provided with a key —39— which is spring pressed by a spring —40— into a key-way —41— in the post —24— for holding the arm —37— against lateral movement about the axis of the post and thereby keeping the sight opening —38— in axial alignment with the drill.

The object of this vertical adjustment of the arm —37— is to permit the sight opening —38— to be brought sufficiently close to

the work to enable the operator to correctly register the drill holes in the metallic section of the band with the drill and also to permit the insertion of work of different thicknesses between the top of the table —13— and arm when the table is in its extreme upper position, the arm —37— being frictionally held in its adjusted position by the engagement of the pin —39— with the post —24—.

Operation.

Assuming that the table —13— is pressed upwardly to the limit of its upward movement or until the shoulder —17— engages the shoulder —18—, the work, such as a brake band —A— is then pressed upon the upper surface of the table and adjusted to bring its rivet hole as —*a*— in the metallic section therefrom into visual registration with the upper end of the drill —29— as determined by the line of sight to the opening —38—, it being understood that the shaft —15— is then being rotated by the motor after which the work is pressed downwardly by hand thereby effecting a corresponding depression of the work table —13— until the drill —29— passes through the lining of the superposed portion of the work and thence into the hole in the metallic section thereof, this downward pressure of the work table being continued until limited by the stop —36— at which time the counter-boring tool —27— will have performed its work of counter-sinking the inner face of the work around the rivet hole for receiving the inner end of the rivet.

As soon as the downward pressure upon the work and work table is released both are returned to their extreme upward position by the spring —19— whereupon the work may be again adjusted to bring another hole into registration with the drill and counter-boring tool for repeating the operation just described.

The distance between the bottom of the gear housing —3— and top of the table —13— when the latter is in its extreme upward position is less than the diameter of the smallest brake band to be operated upon so that when the intermediate portion of the band is resting upon the table its ends may extend downwardly and around the underside of the gear case thereby increasing the range of usefulness of the device as a whole and greatly facilitating the operation of drilling and counter-boring the work.

What I claim is:

1. In a machine for boring the linings of brake bands and the like, a support, a motor mounted on the support with its axis extending horizontally, a gear case mounted on one end of the motor case and extending laterally beyond the support, an upright shaft journaled in the gear case at right angles to the motor shaft, gears within the case for transmitting motion from the motor shaft to the upright shaft, said gear case being provided with a guide opening in its upper side co-axial with its upright shaft, a work-supporting table movable vertically above the gear case and provided with a hub guided in said opening and slidable telescopically upon the upright shaft, a spring surrounding the upright shaft and engaged with the lower face of the hub for pressing the work table upwardly, means for limiting the upward movement of the work table, adjustable means for limiting the downward movement of the table, means for preventing rotation of the work table about the axis of the upright shaft, a boring tool on the upper end of the upright shaft, and means for registering the part of the work to be operated upon with the boring tool.

2. In a machine for boring the linings of brake bands and the like, a horizontal motor, a gear case secured to one end of the motor and provided with a vertical guide opening, a work table having a hub movable vertically in said guide opening, an upright shaft journaled in said hub, a boring tool in the upper end of the shaft, and means for transmitting rotary motion from the motor to said shaft, an upright guide post at one side of the shaft for guiding the work table in its vertical movement, and a registering arm adjustable vertically along and upon the guide post above the work table and provided with a sight opening in vertical alinement with the axis of the shaft.

In witness whereof I have hereunto set my hand this 23rd day of March, 1925.

GEORGE B. CADY.