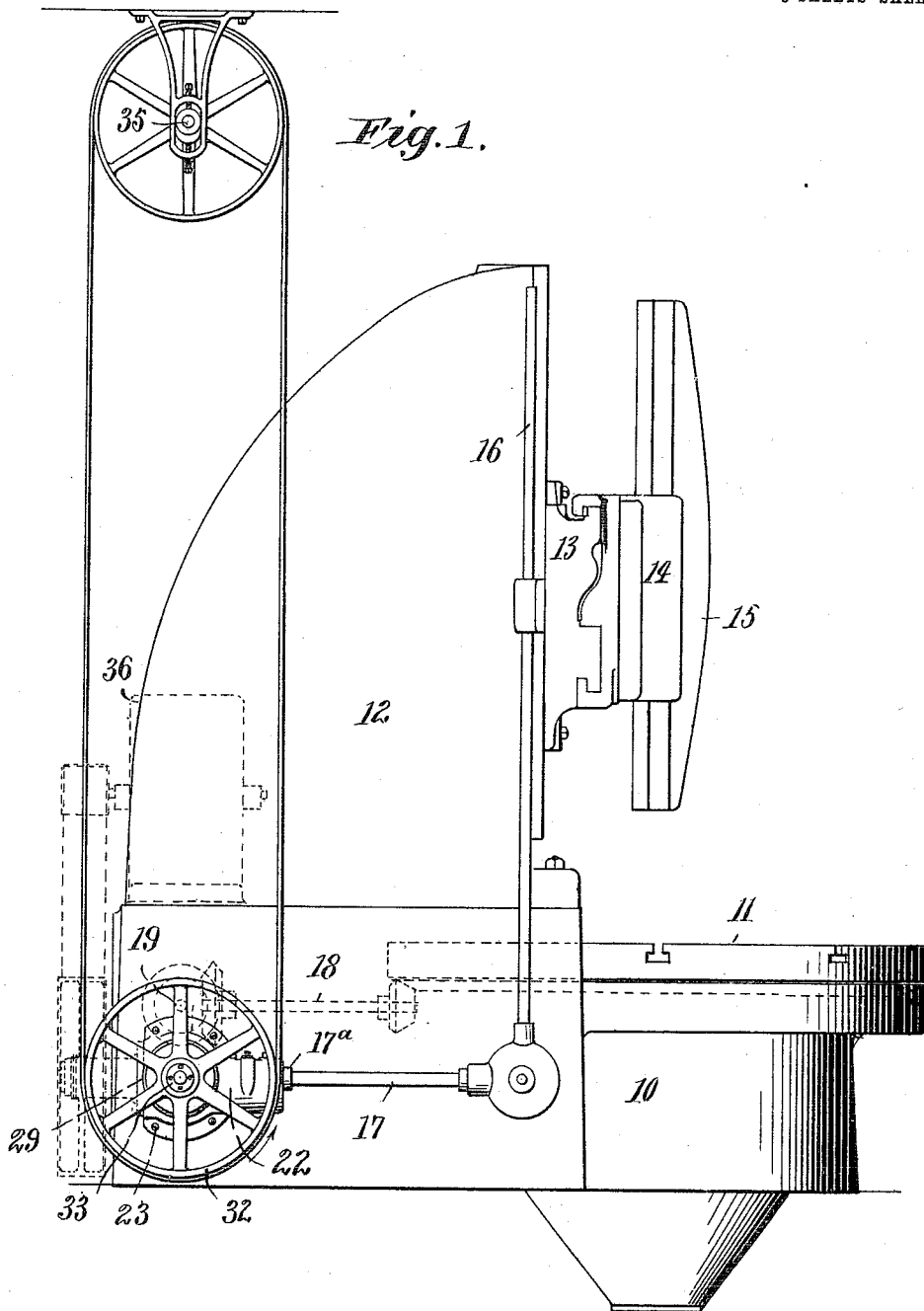


E. P. BULLARD, JR.
 CHANGEABLE DRIVING CONNECTION FOR MACHINE TOOLS.
 APPLICATION FILED JAN. 3, 1911.

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3 SHEETS—SHEET 1.



Witnesses
 Ernst P. Wald
 Ruth M. Worden

Inventor
 Edward P. Bullard Jr.
 By Christian M. Newman
 for Chamberlain & Newman Attorneys

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3 SHEETS--SHEET 2.

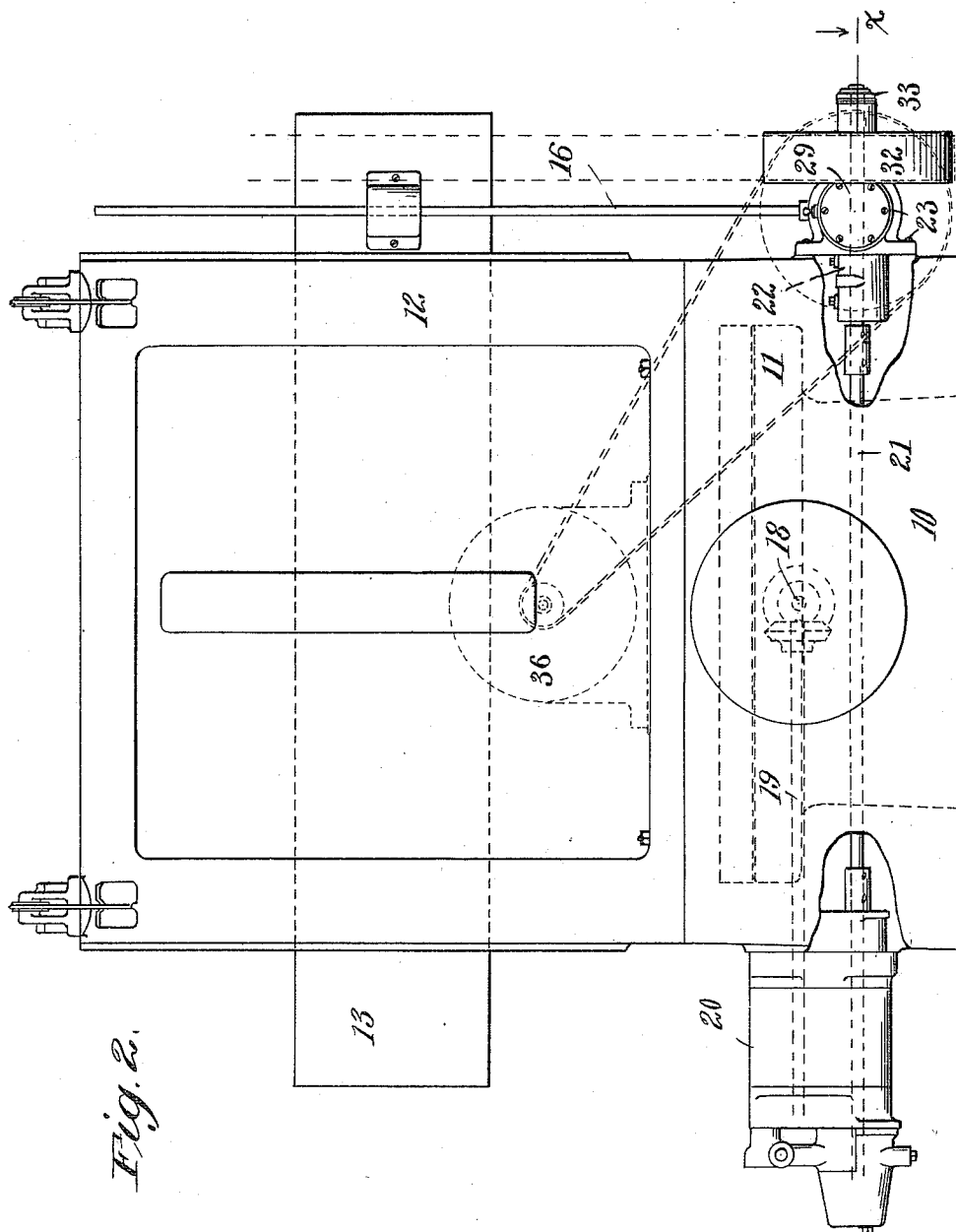


Fig. 2.

Ruth M. Norden for Chamberlain & Mumma Attorneys

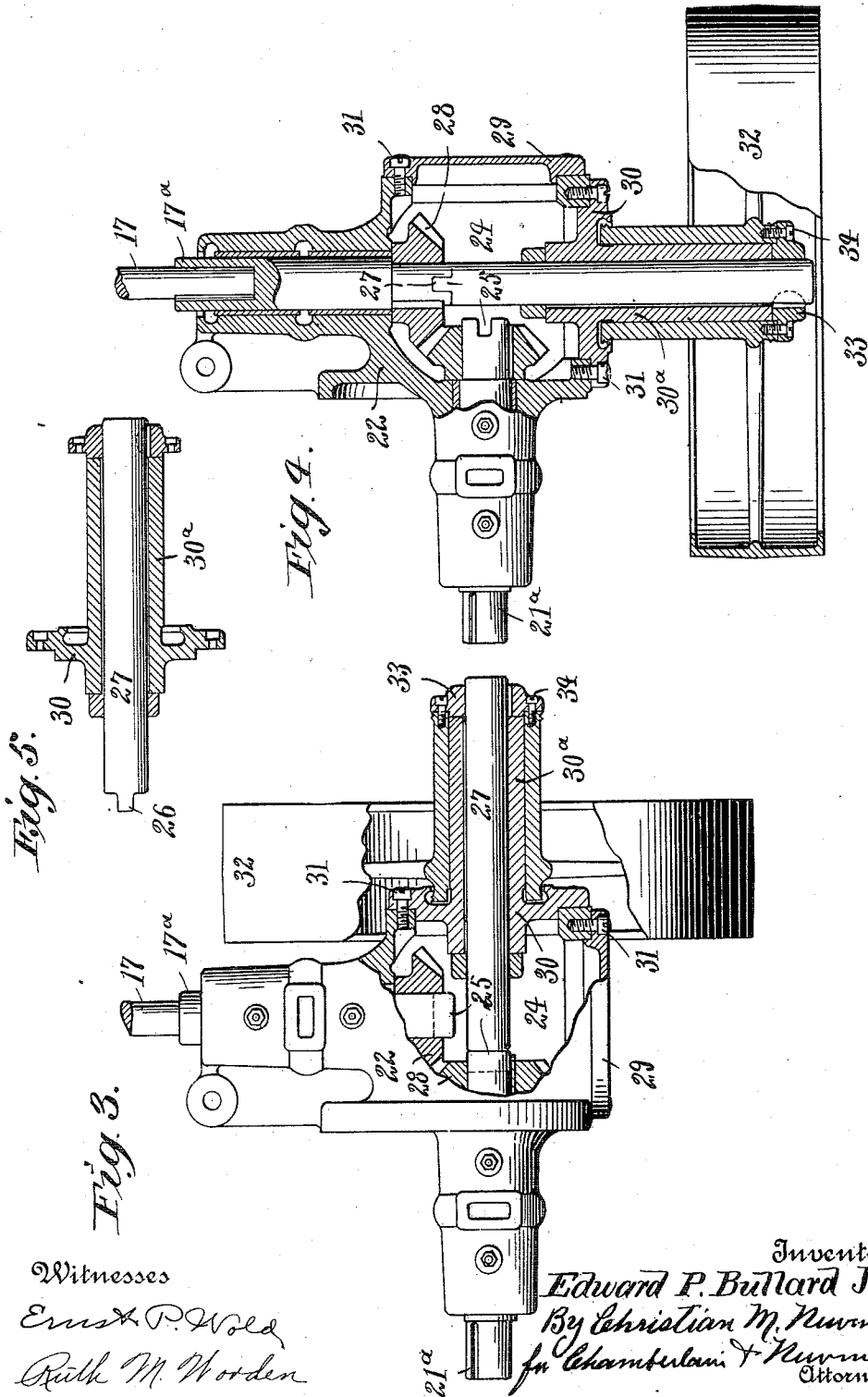
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UNITED STATES PATENT OFFICE.

EDWARD P. BULLARD, JR., OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE BULLARD MACHINE TOOL COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF CONNECTICUT.

CHANGEABLE DRIVING CONNECTION FOR MACHINE-TOOLS.

995,322.

Specification of Letters Patent. Patented June 13, 1911.

Application filed January 3, 1911. Serial No. 600,617.

To all whom it may concern:

Be it known that I, EDWARD P. BULLARD, Jr., citizen of the United States, and resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Changeable Driving Connections for Machine-Tools, of which the following is a specification.

This invention relates to new and useful improvements in machine tools, and particularly to boring mills, lathes and max-mills, such as are employed in the machining of heavy castings, and each of said machine tools includes in part a rotary table, and a tool carrying head that are adjustably mounted with relation to the table and adapted to operate upon the stock carried by the table. The tables of this class of machines are usually driven through a speed mechanism and also provided with connections for operating the cross rail, and tool head, not shown. The majority of this class of machines are provided with a motor whereby the tool can be driven from that source while others again do not use the motor and are driven from a counter shaft arranged in the old style way, and arranged adjacent thereto. The motors for this class of machine are usually located in the rear and upon the bed of the machine, between the uprights, and as there is but one way to belt from it to the driving mechanism, it requires the pulley of the driving mechanism to be located at the rear of the machine. This location of the pulley is in many cases also best suited to the position of the counter shaft, though in the majority of cases the counter shaft is arranged at a right angle thereto, and therefore the driving pulley for the driving mechanism must in a like manner be arranged at a right angle to the motor shaft or in other words, on the side of the machine.

It is therefore the purpose of my invention to provide an improved form of bracket through which the several parts of the machine are operated, and which can be readily shifted from the side to the rear, or vice versa, to better accommodate either the motor or a countershaft drive as occasion may require. To construct this bracket so that the driving parts will be interchangeable,

and that the bearing and its shaft supporting driving pulley can be detached from the one side and similarly attached at a right angle, to the other side so as to connect with either of two shafts arranged at right angles to each other, and also to provide a cap which is similarly adapted to inclose either of the two sides of the bracket not inclosed by the bearing before referred to, and finally to provide an interchangeable mechanism which when assembled will tightly close the gear box, bearings and operative parts to form a tight, dust and oil proof bracket.

With the above and other minor objects in view, my invention resides and consists in the novel construction and combination of parts shown upon the accompanying three sheets of drawings forming a part of this specification and upon which similar characters of reference denote like or corresponding parts throughout the several figures and of which,

Figure 1, shows a side outline view of an improved type of boring mill, to which my invention is shown applied. Fig. 2, is a rear view of the boring mill and my novel interchangeable driving mechanism shown in Fig. 1. Fig. 3, is an enlarged horizontal sectional plan view of the said reversible driving mechanism shown in the preceding figures and taken on line *x* of Fig. 2. Fig. 4, is a somewhat similar sectional plan view of said driving mechanism with the pulley, its bearing and shaft, shifted to a right angular position from that shown in Fig. 3, and corresponding with dotted views of the pulley illustrated in Figs. 1 and 2, and Fig. 5, is a detached longitudinal sectional view of the bearing adapted to inclose the bracket, and pulley shaft to engage either of the two horizontal shafts arranged at right angles to each other.

Referring in detail to the characters of reference marked upon the drawings indicates the bed of the boring mill shown in Figs. 1 and 2, 11 a rotary table mounted therein, 12 uprights secured to the bed, 13 a cross rail arranged vertically upon the face of the uprights, and 14 and 15 a saddle and slide respectively carried by the cross rail and designed to support the tool heads, not shown.

16 and 17 represent shafts that are driven

through my novel interchangeable driving bracket for operating the rail, saddle and slide. 18 and 19 also represent shafts for driving the table 11, through my novel interchangeable bracket, through a train of interchangeable gears inclosed within a housing 20 shown at the left of the machine, see Fig. 2 and a transverse horizontal shaft 21 located in the rear portion of the base of the machine.

From the foregoing it will be noted that the shafts 17 and 21 serve to transmit power to different parts of the machine and are arranged on the same plane, but at right angles to each other. The inner ends of these shafts are keyed to short extension shafts 17^a and 21^a both of which are journaled in suitable bearings of a bracket 22 which in turn is secured to the side of the base of the machine by screws 23. This bracket thus becomes a fixed part of the machine to form a rigid support and bearing for the interchangeable mechanism through which the machine is operated. The inner ends of the shafts 17^a and 21^a extend into a chamber 24 of the bracket and have formed in such inner ends a cross slot 25 to receive the reduced end 26 of the driving pulley shaft 27. A beveled gear 28 is keyed to the inner end portions of each of the extension shafts 17^a and 21^a and are thus operatively connected within the chamber 24 of the bracket. Both the side and end faces of the bracket are provided with a round hole which is finished and adapted to receive either the detachable cap 29 or the detachable pulley bearing 30. Both the said cap and bearing are provided with similar screws 31 for their attachment in covering the holes of bracket 22 to close its chamber and are made interchangeable one with the other, so that the cap can be shifted from the position shown in Fig. 3 and attached to the same bracket in the position shown in Fig. 4, for closing the end opening previously occupied by the bearing 30. The said bearing in turn may be removed from the opening in the side of the bracket as shown in Fig. 3 and placed to close the opening shown in the end of the bracket 22 as shown in Fig. 4. The bearing 30 includes an annular plate portion which serves to carry the attaching screws 31 and to close the opening of the bracket 22, and also forms a longitudinal cylindrical bearing portion 30^a upon which the hub of the driving pulley 32 is free to rotate. The short pulley shaft 27 is operatively mounted within the bearing 30^a and is driven from the pulley 32 through a connecting collar 33 secured to the end of the pulley hub by screws 34 as shown in Fig. 3 when used upon the side face of the bracket 22, and driven from the counter-shaft 35 but is reversed upon said bearing as shown in Fig. 4 when the pulley is located at the end of the bracket as

shown in Fig. 4 and driven from the motor 36. In one instance the pulley is thus located somewhat farther from the bracket than in the other, better to line with the driving pulley from which it is operated.

From the foregoing construction it will be noted that by my simple and practical form of interchanging shaft, bearing and cap, and a reversible pulley, I am able to build a machine which is particularly adapted for both an electric motor, or counter-shaft drive, by the interchanging of a few parts which can be shifted in a very few minutes and that the driving pulley for the machine can thus be shifted to operate from either of two positions.

Having thus described my invention what I claim and desire to secure by Letters Patent is—

1. In a driving connection for machine tools, the combination of a bracket adapted for attachment to a machine, and having a gear chamber formed therein with two open sides, driven shafts mounted in bearings of the bracket and arranged at right angles to each other with their ends disposed in the said chamber, a shaft bearing adapted to close either of the said openings, a driving shaft mounted in the bearing and adapted to connect with either of the said driven shafts, and a pulley connected with the driving shaft journaled in the bearing and adapted to be shifted with the attachable bearing and driving shaft to occupy either of two positions.

2. In a driving connection for machine tools, the combination of a bracket adapted for attachment to a machine and having shaft bearings arranged therein at a right angle to each other, driven shafts in such bearing, driving connections for such shafts, a driving shaft bearing adapted to be attached to the bracket in alinement with either of its bearings, a driving shaft journaled in said last mentioned bearing for connection with either of the before mentioned driven shafts, and means for operating the driving shaft.

3. In a driving connection for machine tools, the combination of a bracket adapted for attachment to a machine and having a gear chamber formed therein with two open sides, driven shafts mounted in bearings of the bracket and arranged at right angles to each other with their intersecting ends disposed in the said chamber, gears connecting the two driven shafts in the bracket, an attachable shaft bearing adapted to close either of the said openings, a driving shaft mounted in the attachable bearing and adapted to connect with either of the said driven shafts, a pulley connected with the driving shaft journaled in the attachable bearing and adapted to occupy either of two positions, and a plate for covering the sec-

ond opening and formed to fit either of said openings and made interchangeable with the attachable bearing.

4. In a driving connection for machine tools, the combination of a bracket adapted for attachment to a machine and having driven shaft bearings arranged therein at a right angle to each other, shafts in such bearings, driving connections for such shafts, a shaft bearing adapted to be attached to the bracket in alinement with either of the said driven shafts mounted in said last mentioned bearing, a driving pulley mounted upon the said driving shaft bearing, a driving shaft journaled in the last mentioned bearing and connected to be driven by the pulley and adapted to interchangeably connect with either of the annularly disposed shafts before mentioned.

5. In a driving connection for machine tools, the combination of a bracket adapted for attachment to a machine and having a gear chamber formed therein with both a side and rear opening, driven shafts mounted in bearings of the bracket and arranged at right angles to each other with ends disposed in the said chamber, driving connections for such shafts, a shaft bearing adapted to close either of the said openings, a shaft

mounted in the shaft bearing adapted to connect with either of the said driven shafts, and a pulley connected with the driving shaft journaled in the bearing and adapted to be shifted with the attached driving shaft and bearing from the side to the back of the machine.

6. In a driving connection for machine tools, the combination of a bracket adapted for attachment to a machine and having a gear chamber formed therein with two side openings and arranged at an angle to each other, two driven shafts in the bearings of the bracket, gear connections for such shafts, a driving shaft bearing adapted to be attached to the bracket in alinement with either of the said driven shafts mounted in the bracket, a shaft mounted in the bearing and having an end shaped to engage the end of either of the before mentioned driven shafts, and means for operating the said driving shaft.

Signed at Bridgeport in the county of Fairfield and State of Connecticut this 28th day of December A. D., 1910.

EDWARD P. BULLARD, JR.

Witnesses:

C. M. NEWMAN,
G. N. MOOREHOUSE.