May 14, 1929. W. W. LECK 1,713,138

ROD STRAIGHTENING MACHINE

Filed Aug. 6, 1927 3 Sheets-Sheet 1

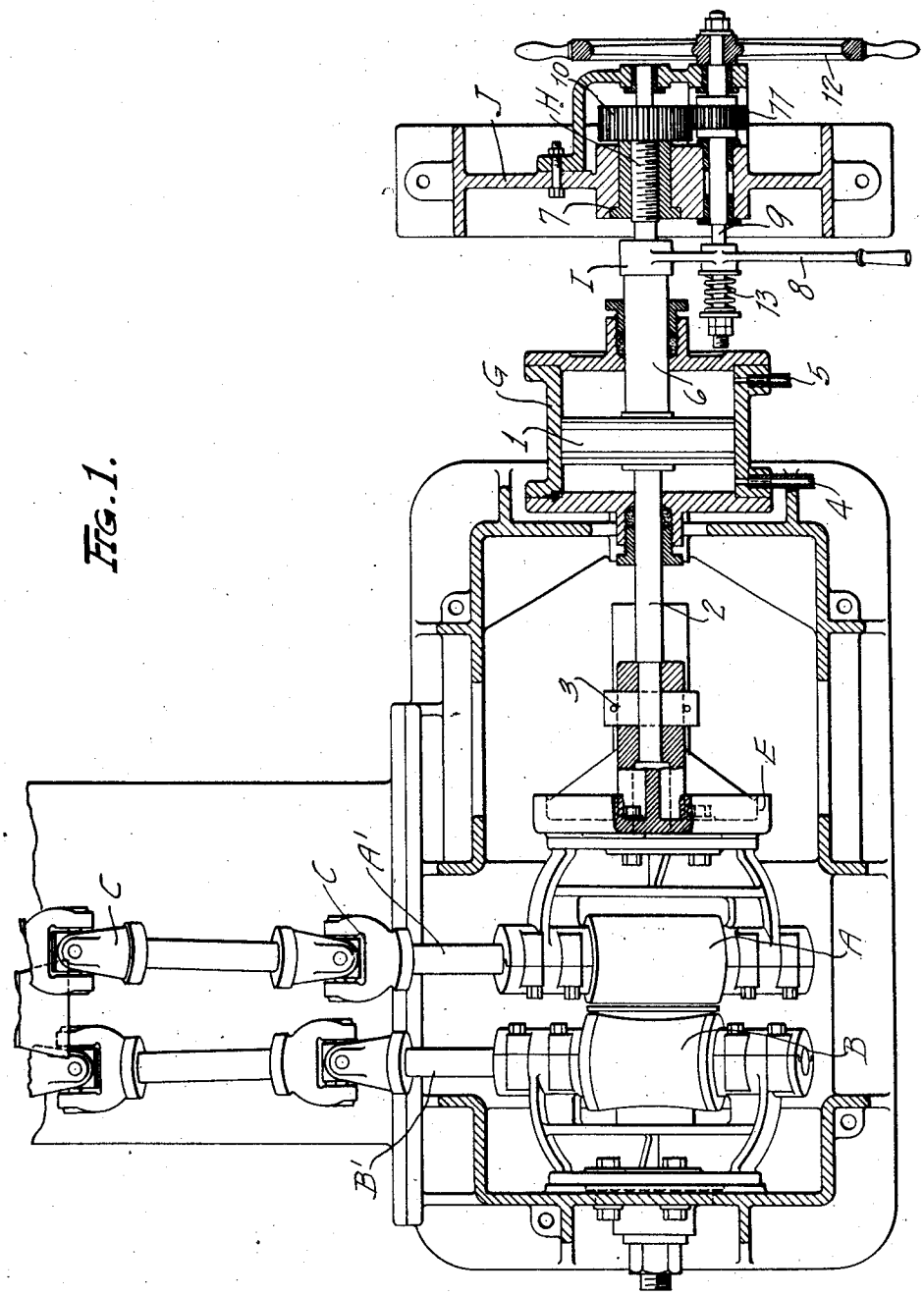


FIG. 1.

INVENTOR
W. W. LECK

BY Bakewell & Church
ATTORNEY

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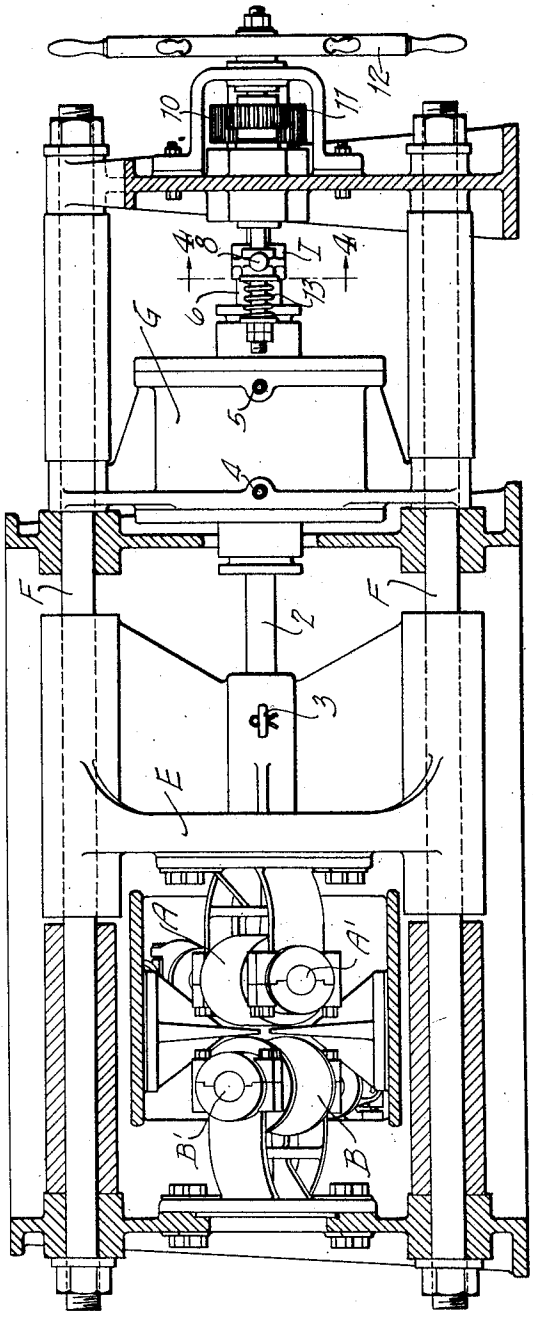


Fig. 2.

INVENTOR
W. W. LECK
By Bakewell & Church
ATTORNEY

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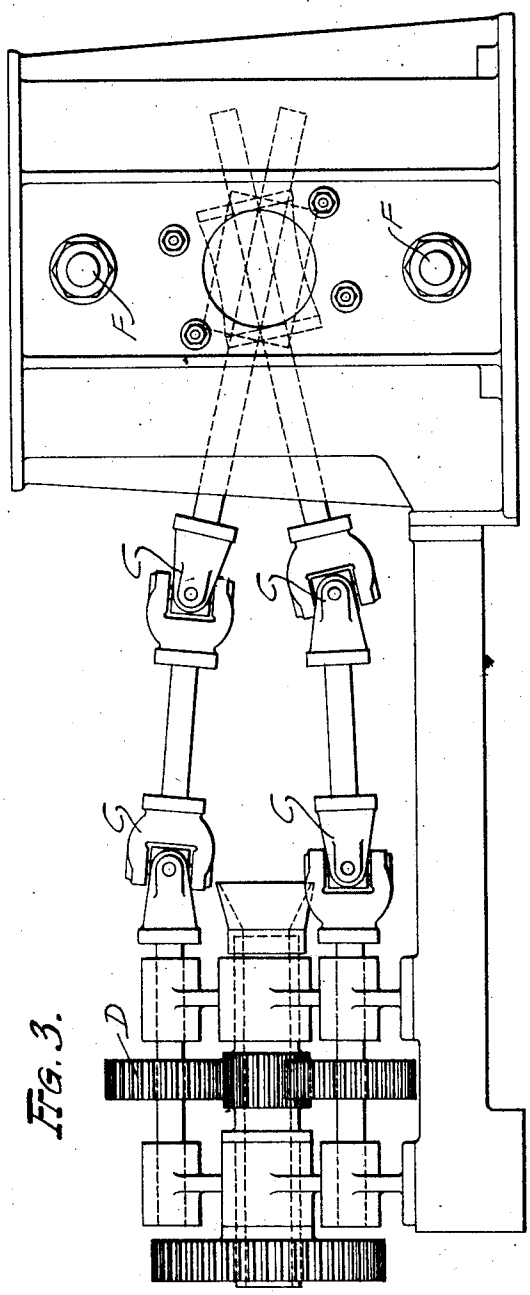


FIG. 3.

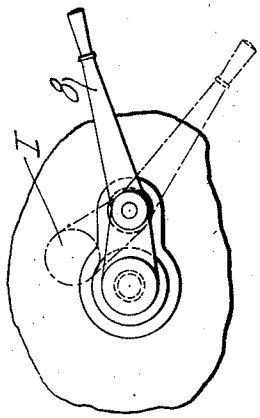


FIG. 4.

INVENTOR
W. W. LECK
BY Bakewell & Church
ATTORNEY

Patented May 14, 1929. 1,713,138

UNITED STATES PATENT OFFICE.

WALTER W. LECK, OF ST. LOUIS, MISSOURI, ASSIGNOR TO SCULLIN STEEL COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF DELAWARE.

ROD-STRAIGHTENING MACHINE.

Application filed August 6, 1927. Serial No. 211,140.

This invention relates to machines of the kind that are used for straightening round rods, and particularly, to machines of the type that are equipped with rolls between which the rod is passed to effect the straightening of the rod.

The main object of the invention is to provide a practicable machine of simple design for straightening sucker rods, bars, tie rods and members of similar form composed of a long shank of circular shape in cross section, provided at one or both ends with a head or enlarged portion.

Another object is to provide a machine of the kind referred to that is equipped with a novel means for quickly opening and closing the rolls so as to permit the heads or enlarged portions of the rods to pass between the rolls, and for insuring the opposed rolls exerting the required pressure on a rod during the straightening operation.

Figure 1 of the drawings is a top plan view, partly in horizontal section, of a straightening machine constructed in accordance with my invention.

Figure 2 is a vertical transverse sectional view of said machine.

Figure 3 is a side elevational view of said machine; and

Figure 4 is a detail view of the shiftable abutment member that forms part of the mechanism for holding the movable roll carrier rigid during the straightening operation.

Referring to the drawings which illustrate the preferred form of my invention, A and B designate a straight roll and a concaved roll, respectively, arranged in opposed relation, as shown in Figure 1, and disposed at opposite angles as is the usual practice in machines of the roll type, such as are used for rolling round rods or bars to make them straight, said rolls being connected to shafts A′ and B′ which are joined by universal joints C with a driving mechanism of any preferred type, herein illustrated as consisting of a gearing D. The rod, bar or other member that is to be straightened is inserted endwise into the space between the straight roll A and concaved roll B and the rotary movement of the rolls causes said rod to be fed longitudinally between the rolls and subjected to such action as to remove slight kinks, bends or irregularities in the rod.

In conventional machines of this general type the carriers that support the shafts of the rolls are not capable of being moved quickly relatively to each other, to open and close the rolls, and accordingly, such machines are not adapted for use in rolling sucker rods and other members that are provided with heads or enlarged portions of greater diameter than the space between the rolls when the rolls are closed. In my improved machine the shaft of one roll, preferably the straight roll A, is mounted in a carrier E that can be moved quickly towards and away from the carrier in which the shaft B′ of the roll B is mounted, thereby enabling the rolls to be separated sufficiently to permit the head or enlarged portion of a sucker rod to be inserted between the same, then closed or moved into tight engagement with the portion of the rod that is to be straightened, and thereafter opened to permit the head or enlarged portion at the opposite end of the rod to pass between the rolls at the completion of the straightening operation. Various means can be used to shift or move the carrier E so as to open and close the rolls and to hold said carrier rigid during the straightening operation, but I prefer to use a piston actuated by an expansible medium or hydraulic medium to shift or bodily move the carrier E and use a shiftable abutment member and a thrust bearing that co-operate with a part on said piston to hold the carrier rigid during the straightening operation.

In the machine herein shown the carrier E is slidingly mounted on two horizontally-disposed rods F that extend transversely of the machine, and an air cylinder G is arranged at the right hand end of the carrier, as shown in Figures 1 and 2, the piston 1 of said air cylinder being provided with a rod 2 that is connected at its outer end to the carrier by a key 3 that extends through a hole in the piston rod 2 and a hole in a portion of the carrier E into which the piston rod extends. Air under pressure is admitted to and exhausted from one end of the cylinder G through a pipe 4, and at the opposite end of said cylinder is a separate pipe 5 through which air under pressure is admitted to and exhausted from the cylinder.

At the outer end of the cylinder G is an adjustable thrust bearing H that is adapted to co-operate with a shiftable abutment member I to hold the piston 1 rigid during the straightening operation, said thrust bearing

being arranged in longitudinal alignment with an extension 6 on the piston, and the abutment member I being so constructed and arranged that it can be inserted and withdrawn quickly from operative position between the thrust bearing H and the extension 6 on the piston. Preferably, the thrust bearing H consists of an externally screw-threaded element that passes through an internally threaded, rotatable nut 7 carried by the frame J of the machine, and the abutment member I consists of a block carried by a lever 8 that is rockably mounted on a support 9 arranged at one side of the thrust bearing H parallel to the same, as shown in Figure 1. Any suitable means can be used to move the thrust bearing H towards and away from the extension 6 on the piston, such, for example, as a pinion 10 rigidly fastened to the nut 7 and arranged in mesh with a pinion 11 that is connected with a hand wheel 12. The lever 8 is mounted on its support 9 in such a way that it is capable of moving longitudinally of the same, when the thrust bearing H is moved inwardly, and a spring 13 is combined with said lever so as to exert pressure on same in a direction tending to move it longitudinally of the support 9 to the right, looking at Figure 1.

When the rolls A and B of the machine are open or separated, the abutment member I occupies the position shown in broken lines in Figure 4, and rests upon the extension 6 on the piston 1. At such times the inner end of the thrust bearing H is positioned to the right of the abutment member I, and the piston 1 is positioned at the right hand end or outer end of the cylinder G. After the head or enlarged portion on one end of the sucker rod has been passed between the rolls, compressed air is admitted to the cylinder G through the supply pipe 5, thereby causing the piston 1 to move the carrier E quickly to the left, so as to close the rolls or cause them to exert pressure on the sucker rod. As soon as the extension on the piston 1 clears the abutment member I, said member swings downwardly into longitudinal alignment with said extension, as shown in full lines in Figure 4, and thereafter the operator in charge of the machine turns the hand wheel 12 in a direction to cause the thrust bearing H to exert pressure on the abutment member I in a direction to force it tightly against the extension 6 on the piston, and thus hold the carrier E perfectly rigid during the straightening operation. When the rolls A and B start to revolve, they feed the sucker rod forwardly and simultaneously straighten said rod, and if there is a head or enlarged portion at the other end of the sucker rod, the rolls are separated or opened just before said head or enlarged portion reaches the rolls. The separation of the rolls is effected by turning the hand wheel 12 in the reverse direction, so as to relieve the pressure of the thrust bearing H on the abutment member I, then pressing the lever 8 downwardly, so as to move the abutment member I out of alignment with the extension 6 on the piston, and thereafter admitting compressed air to the left hand end of the cylinder G through the pipe 4, so as to move the roll carrier E quickly to the right, looking at Figure 1, the lever 8 being released so as to permit the abutment member to swing downwardly and come to rest on the extension 6 on the piston 1.

From the foregoing it will be seen that my machine is highly practicable for use in straightening sucker rods and other members provided with enlarged end portions, due to the fact that an expansible medium, such as compressed air, is used to separate the rolls to permit the enlarged end portions of the rods to pass the rolls, and is also used to close the rolls or arrange them in the position they occupy during the straightening operation. Notwithstanding the fact that an expansible medium is used to move the roll carrier E, towards and away from the carrier on which the roll B is mounted, the two roll carriers of the machine are held perfectly rigid and are prevented from separating during the straightening operation, by the abutment member I and the thrust bearing H which form a solid backing for the piston 1 of the air cylinder.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A machine for straightening rods, bars and similar members provided at one or both ends with an enlarged end portion, comprising opposed rolls that exert pressure on the rod during the straightening operation, a piston adapted to be actuated by an operating medium for separating the rolls to permit the enlarged portion of the rod to pass the rolls and for closing the rolls to cause them to engage the rod, and an independent means for maintaining the rolls in operative relationship with each other during the rolling operation.

2. A machine for straightening rods, bars and similar members provided at one or both ends with an enlarged end portion, comprising opposed rolls that exert pressure on the rod during the straightening operation, a piston adapted to be actuated by an operating medium for separating the rolls to permit the enlarged portion of the rod to pass the rolls and for closing the rolls to cause them to engage the rod, and a means for holding said piston rigid during the straightening operation comprising a shiftable abutment member arranged so that it can be moved quickly into a position to permit the piston to move in a direction to separate the rolls.

3. A machine for straightening rods, bars and similar members provided at one or both

ends with an enlarged end portion, comprising opposed rolls that exert pressure on the rod during the straightening operation, a piston adapted to be actuated by an operating medium for separating the rolls to permit the enlarged portion of the rod to pass the rolls and for closing the rolls to cause them to engage the rod, a shiftable abutment member that is adapted to be moved into operative relationship with the piston after the rolls have been closed and moved into an inoperative position with relation to the piston when it is desired to open the rolls, and an adjustable thrust bearing that co-operates with said abutment member to form a rigid backing for said piston during the straightening operation.

4. A machine for straightening rods, bars and similar members provided at one or both ends with an enlarged end portion, comprising opposed rolls that exert pressure on the rod during the straightening operation, a movable carrier for one of said rolls, an operating cylinder provided with a piston that is connected with said carrier, an extension on said piston, and an adjustable thrust bearing for said extension that is adapted to be manipulated by the operator in charge of the machine after the rolls have been closed, so as to hold the roll carrier rigid during the straightening operation.

5. A machine for straightening rods, bars and similar members provided at one or both ends with an enlarged end portion, comprising opposed rolls that exert pressure on the rod during the straightening operation, a movable carrier for one of said rolls, an operating cylinder provided with a piston that is connected with said carrier, an extension on said piston, an adjustable thrust bearing for said extension that is adapted to be manipulated by the operator in charge of the machine after the rolls have been closed, so as to hold the roll carrier rigid during the straightening operation, and an abutment member arranged so that it can be shifted quickly into and out of operative position between said extension and said thrust bearing.

6. A machine for straightening rods, bars and similar members provided at one or both ends with an enlarged portion, comprising opposed, angularly-disposed rolls that exert pressure on the rod during the straightening operation, a movable carrier for one of said rods, an operating cylinder, provided with a piston that is connected with said carrier, an extension on said piston, a thrust bearing arranged in longitudinal alignment with said extension, means for adjusting said bearing, and an abutment member arranged so that it will shift into operative position between said extension and said thrust bearing when the piston moves in a direction to close the rolls.

WALTER W. LECK.