May 17, 1932. J. V. MAZURIE ET AL 1,858,962

TUBE EXPANDING MILL

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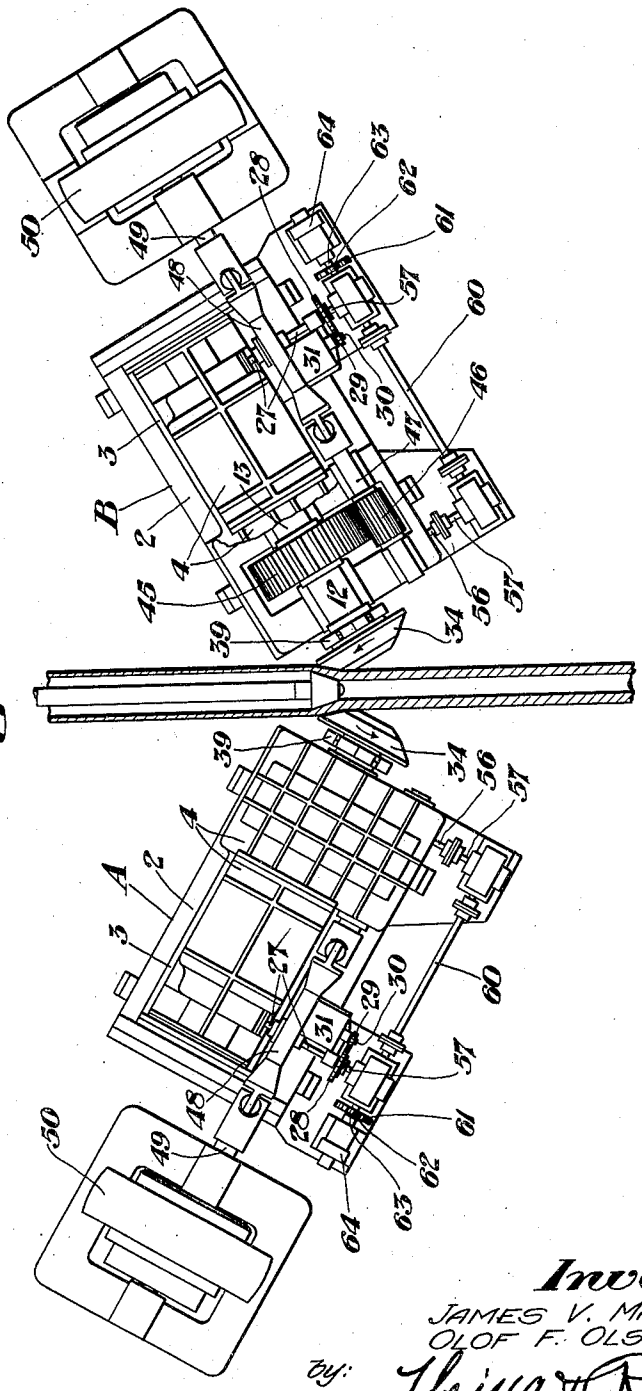


Fig. 1.

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Fig. 2.

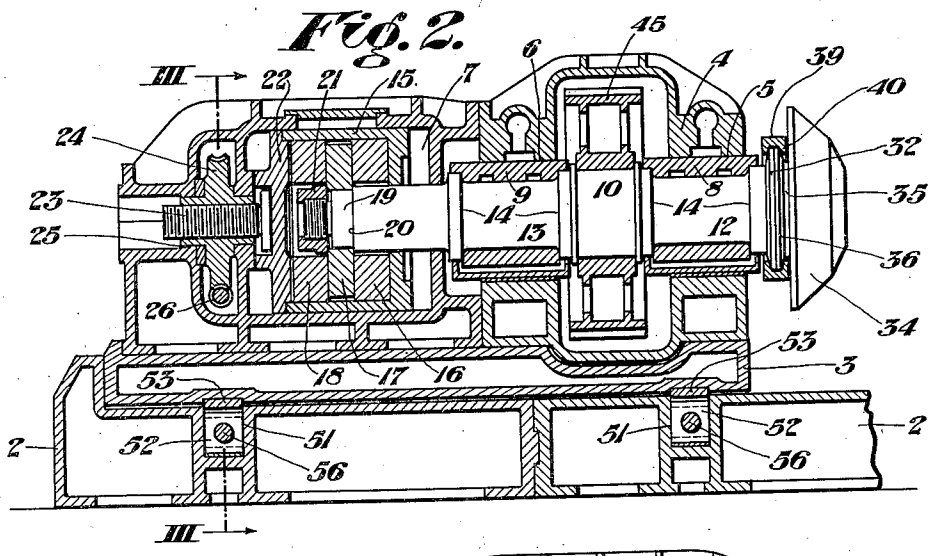


Fig. 3.

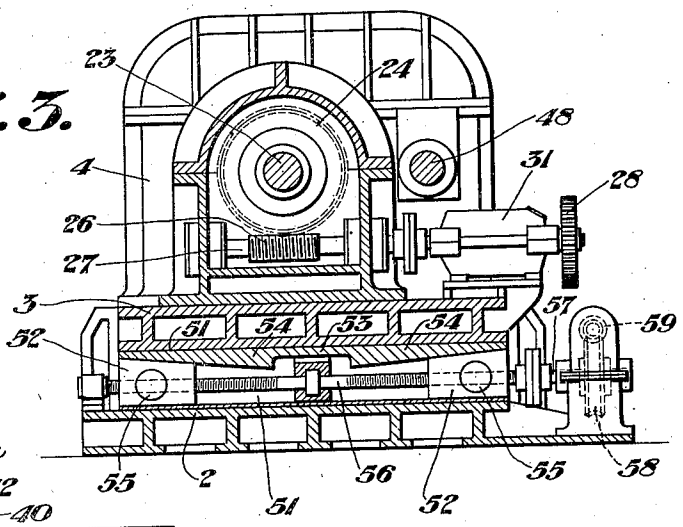
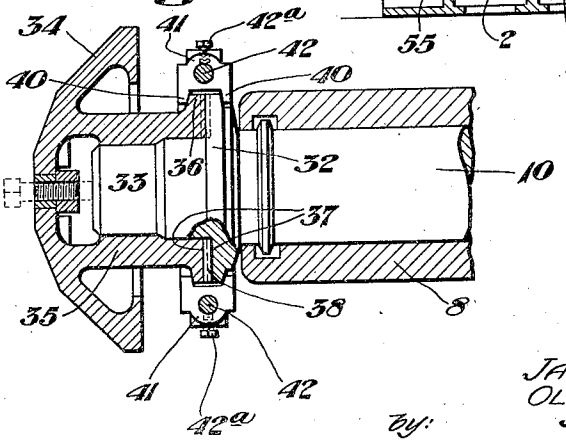


Fig. 4.



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Fig. 5.

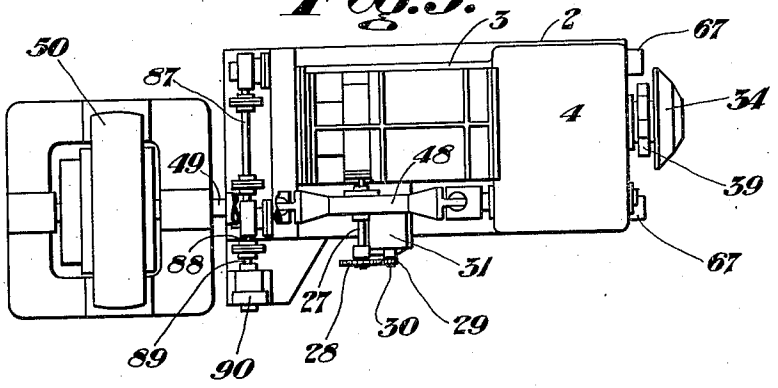


Fig. 6.

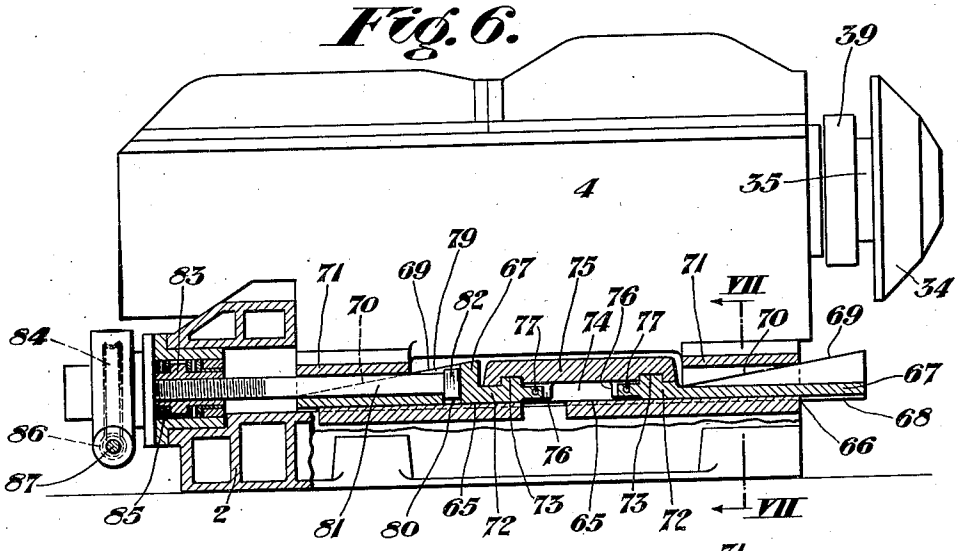
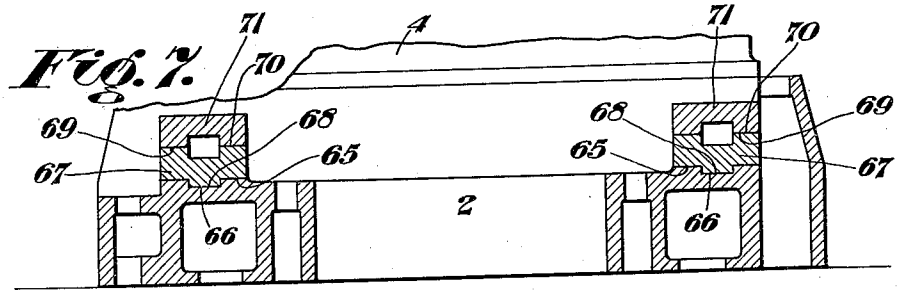


Fig. 7.



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1,858,962

UNITED STATES PATENT OFFICE

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TUBE EXPANDING MILL

Application filed December 4, 1929. Serial No. 411,538.

This invention relates to expanding mills for use in the manufacture of seamless tubes and the like and has for its object the provision of a novel means for vertically adjusting the individual roll units of such mills relative to each other.

Heretofore, it has been customary to provide for vertical adjustment of the expanding rolls by adjusting the roll bearings which necessitated more or less complicated mechanism and also prevented the use of the rigid construction which is possible by the use of the present invention.

In the drawings—

Figure 1 is a plan view of an expanding machine constructed in accordance with this invention.

Figure 2 is an enlarged detail sectional elevation through one of the units of the machine showing the roll-shaft mounting.

Figure 3 is a sectional elevation taken on the line III—III of Figure 2.

Figure 4 is a fragmentary detail showing the roll mounting on the shaft.

Figure 5 is a plan view of one of the units of the expanding machine showing a modified mechanism for vertically adjusting the housings.

Figure 6 is an enlarged elevation partly in section showing the wedge adjusting members of the modified construction in detail.

Figure 7 is a sectional view taken on the line VII—VII of Figure 6.

Referring more particularly to the drawings, the letters A and B designate the roll units which go to make up the mill and which are of duplicate construction.

The units A and B each comprises a base 2 on which is mounted a housing bed-plate 3 supporting a housing 4.

The housing 4 is provided with bearing receiving openings 5, 6 and 7. The openings 5 and 6 are adapted to receive bearings 8 and 9 in which a roll-shaft 10 is journaled. The shaft 10 is reduced in diameter at its bearing points, as at 12 and 13, forming shoulders 14 at each end of the bearing points. The bearings 8 and 9 are divided longitudinally to form two parts which are fitted around the reduced diameter portions 12 and 13 of the shaft and said bearings are shaped to snugly fit between the shoulders 14 and thereby be held against longitudinal movement relative to the shaft. The bearings 8 and 9 have a sliding fit in the housing openings 5 and 6 and therefore the shaft 10 and bearings 8 and 9 may be bodily moved relative to the housing in a direction parallel with the longitudinal axis of the shaft.

A thrust-bearing assembly comprising a housing 15 and disks 16, 17 and 18 is slidably mounted in the opening 7 in the unit housing. The rear end of the shaft 10 extends into the bearing housing 15 and extends freely through the bearing disks 16 and 18. The disk 17 is mounted on a reduced end 19 of the shaft and clamped against a shoulder 20 by a nut 21.

The rear end of the bearing housing is closed by a thrust-plate 22 which is engaged by a threaded thrust-bar 23 which is threaded into the hub of a worm-wheel 24 journaled in a bearing opening 25 in the housing 4 and adapted to be rotated to move the thrust-bar 23 against or away from the thrust-plate 22 to thus adjust the longitudinal position of the roll-shaft 10.

The worm-wheel 24 is in mesh with a worm 26 carried by a shaft 27 which is journaled in the housing 4 and is provided at its outer end with a gear 28 which is meshed with a pinion 29 on the armature shaft 30 of a reversing motor 31.

It will thus be understood that the roll-shaft 10 may be readily adjusted longitudinally by energizing the motor 31 which will cause a rotation of the worm-wheel 24 which, in turn, serves as a nut to move the thrust-bar 23 toward or away from the thrust bearing which bearing limits the endwise movement of the shaft 10.

In order to rotate the roll-shaft 10 a gear 45 is keyed or otherwise secured on the shaft 10 between the bearings 8 and 9, and said gear is in mesh with a drive pinion 46 carried by a shaft 47 which is connected by a flexible coupling 48 with the armature shaft 49 of a drive motor 50.

The head or roll end of the shaft 10 is provided with a peripheral flange 32 adjacent

its end and a roll supporting stub 33 extends outwardly beyond said flange. The roll 34 which is of the usual frusto-conical type is provided with a sleeve portion 35 adapted to fit over the stub 33 and the sleeve 35 terminates in a peripheral flange 36 of the same diameter as the flange 32 on the shaft 10. The faces of the flanges 32 and 36 are parallel and abut each other. In order to prevent rotation of the roll 34 relative to the shaft 10, the abutting faces of the flanges 32 and 36 are slotted to form key-ways 37 in which keys 38 are mounted.

The roll 34 is adapted to be removably held against displacement on the shaft 10 by a two-part clamping ring 39 which is grooved to provide flanges 40 extending down over the peripheral flanges 32 and 36 of the roll 34 and roll-shaft 10.

The parts of the ring 39 are provided with bolt lugs 41 to receive bolts 42 for securing the ring parts together. Set-screws 42^a are provided for locking bolts 42 against displacement.

It will be readily appreciated that the above construction permits quick change of the rolls and at the same time provides a secure and positive mounting.

It is necessary during the operation of the mills on different sizes of pipes to adjust the vertical position of the rolls 34 and heretofore this has been accomplished by adjusting the roll-shaft bearings vertically.

In the present construction, the roll-shaft bearings and roll-shaft are so mounted that their vertical position relative to the housing is fixed and the vertical adjustment of the rolls is accomplished by adjusting the complete housing 4 and its assembled parts vertically.

In order to thus adjust the housing 4 vertically and thereby change the vertical positioning of the roll 34, the base 2 is provided with guideway grooves 51 adjacent each end in each of which are mounted a pair of oppositely positioned wedge shaped adjusting blocks 52. Tht housing bed-plate 3 is provided with bearing plates 53 immediately above each of the grooves 51, which plates are provided with bearing surfaces 54 adapted to be engaged by the adjusting blocks 52 and inclined reversely to the inclined taper of the blocks 52.

When the blocks 52 are moved toward each other they will act as wedges against the inclined surfaces 54 of the plates 53 and elevate or lift the housing 4 vertically and when said blocks are moved away from each other the weight of the housing 4 and its assembled mechanism will cause the surfaces 54 of the plates 53 to ride down along the blocks 52 and thereby lower the housing and assembled mechanism.

In order to provide a simultaneous adjustment of all of the members or blocks 52 of each unit, each block is provided with a nut 55 which is in threaded engagement with a screw-shaft 56. Each of the shafts 56 is coupled to a shaft 57 having a worm-wheel 58 thereon which is meshed with a worm 59. The worms 59, in turn, have their shafts coupled to a connecting shaft 60 and the rear worm has its shaft provided with a gear 61 which is meshed with a pinion 62 on the armature shaft 63 of a reversing motor 64.

When the motor 64 is energized the screw-shafts 56 will be rotated to move the blocks 52 in or out and thus raise or lower the housing 4 and roll 34 according to the direction of rotation of the motor.

In Figures 5 to 7 a modified form of mechanism is shown for adjusting the housing 4 and its accompanying parts vertically. In this construction, the housing 4 is set directly on the base 2 and the base 4 is provided with a pair of longitudinally extending alined bearing surfaces 65 adjacent each side which are grooved, as at 66. An adjusting block 67 is slidably mounted on each of the surfaces 65 and is provided with a tongue 68 on its lower face which fits into the groove 66 to prevent sidewise movement of the block. Each of the blocks 67 is provided with downwardly and rearwardly inclined bearing faces 69 which are engaged with the downwardly and rearwardly inclined bearing faces 70 of bearing blocks 71 secured to the housing 4. From the above it will be readily seen that rearward movement of the blocks 67 will cause a wedging action between the inclined bearing faces 69 and 70 which will elevate the housing 4 and therefore the roll, while a forward movement of the blocks 67 will permit the housing 4 to fall or lower by gravity.

In order to provide for simultaneous movement of all the blocks 67, the blocks on the respective sides of the apparatus have their inner or adjacent ends extended, as at 72, and provided with lugs 73 on each side of a central groove 74.

A coupling bar 75 is bridged between the extended portions 72 and provided with recesses to receive the lugs 73 and tongues 76 which extend into the grooves 74. Pins or bolts 77 are adapted to be passed through apertures in the extended portions 72 and tongues 76 to prevent displacement of the coupling bars.

The rear block 67 of each alined pair of blocks is provided with a centrally arranged longitudinally extending groove or slot 79, the forward end of which is enlarged to form a head-pocket 80. A screw-shaft 81 extends into the groove 79 and is provided with a squared head 82 which fits into the head-pocket 80. The threaded shaft 81 is in threaded engagement with the threaded hub extension 83 of a worm-wheel 84 which is journaled with antifriction bearing 85. The

worm-wheel 84 is meshed with a worm 86 and the worms 86, at the opposite sides of the unit, are coupled together by a shaft 87. One of the worms 86 has its shaft extended, as at 88, and coupled to the armature shaft 89 of a reversing motor 90.

It will be readily understood that by energizing the motor 90 the worm-wheels 84 will be rotated to move the screw-shafts 81 either forwardly or rearwardly to thereby slide the blocks 67 forwardly or rearwardly and thus lower or raise the housing unit and roll.

While we have shown and described certain specific embodiments of our invention, it will be understood that we do not wish to be limited thereto since various modifications may be made without departing from the scope of our invention, as defined in the appended claims.

We claim—

1. In an expanding mill for expanding seamless tubes the combination of a base, a housing on said base, a roll-shaft journaled in said housing and held against vertical movement relative to said housing, and means for bodily moving said housing and said roll-shaft vertically relative to said base.

2. In an expanding mill for expanding seamless tubes the combination of a base, a housing on said base, a roll-shaft journaled in said housing and held against vertical movement relative to said housing, a plurality of wedge blocks mounted between said housing and said base, and means for simultaneously shifting said wedge blocks to move said housing and said roll-shaft vertically.

3. In an expanding mill for expanding seamless tubes the combination of a base, a housing on said base, a roll-shaft journaled in said housing and held against vertical movement relative to said housing, a plurality of wedge blocks mounted between said housing and said base, and power means for simultaneously shifting said wedge blocks to move said housing and said roll-shaft vertically.

4. In an expanding mill for expanding seamless tubes the combination of a base, a housing on said base, a roll-shaft journaled in said housing and held against vertical movement relative to said housing, guide slots in said base, a pair of wedge blocks slidably mounted in each of said slots, wear-plates on said housing and slidably engaged by said wedge blocks, said wear plates being inclined opposite to said wedge blocks, and means for sliding said wedge blocks relative to said wear-plates to bodily move said housing and said roll-shaft vertically relative to said base, said means including a motor operated screw-shaft.

5. In an expanding mill for expanding seamless tubes the combination of a base, a housing on said base, a roll-shaft journaled in said housing and held against vertical movement relative to said housing, guide slots in said base, a pair of wedge blocks slidably mounted in each of said slots, wear-plates on said housing and slidably engaged by said wedge blocks, said wear-plates being inclined opposite to said wedge blocks, a nut in each of said wedge blocks, a screw shaft having a threaded engagement with the nuts in each pair of wedge blocks, and power means for simultaneously rotating said screw-shafts to thereby shift said wedge blocks and move said housing and roll-shaft vertically.

6. In an expanding mill for expanding seamless tubes the combination of a base, a housing on said base, a horizontally disposed shaft journaled in said housing and held against movement in any direction transverse to its axis relative to said housing, and means for bodily moving said housing and said roll-shaft vertically relative to said base.

7. In an expanding mill for expanding seamless tubes the combination of a base, a housing on said base, a horizontally disposed shaft journaled in said housing and held against movement in any direction transverse to its axis relative to said housing, a plurality of wedge blocks mounted between said housing and said base, and means for simultaneously shifting said wedge blocks to bodily move said housing and said roll-shaft vertically.

8. In an expanding mill for expanding seamless tubes the combination of a base, a housing on said base, a horizontally disposed shaft journaled in said housing and held against movement in any direction transverse to its axis relative to said housing guide slots in said base, a pair of wedge blocks slidably mounted in each of said slots, wear-plates on said housing and slidably engaged by said wedge blocks, said wear-plates being inclined opposite to said wedge blocks, and means for sliding said wedge blocks relative to said wear-plates to bodily move said housing and said roll-shaft vertically relative to said base, said means including a motor-operated screw-shaft.

In witness whereof, we have hereunto set our hands.

JAMES V. MAZURIE.
OLOF F. OLSON.