Aug. 1, 1950 J. B. PICTON ET AL 2,517,344

MACHINE FOR STRAIGHTENING RODS OR TUBES

Filed Feb. 24, 1949 3 Sheets-Sheet 1

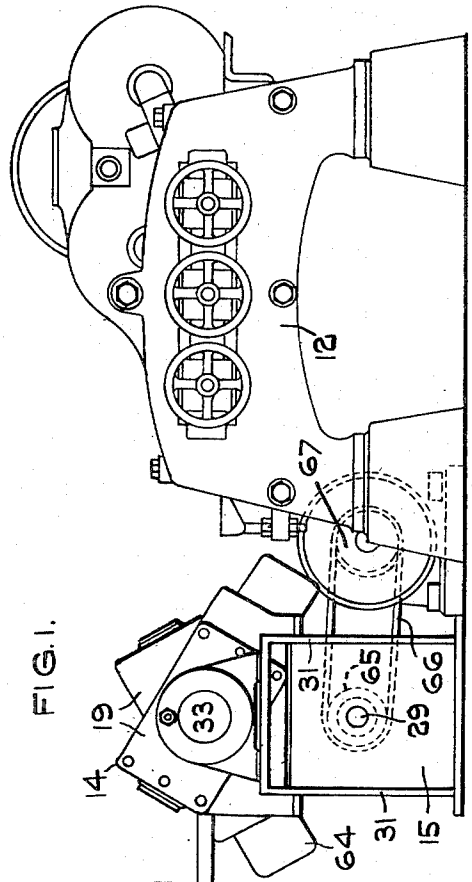


FIG. 1.

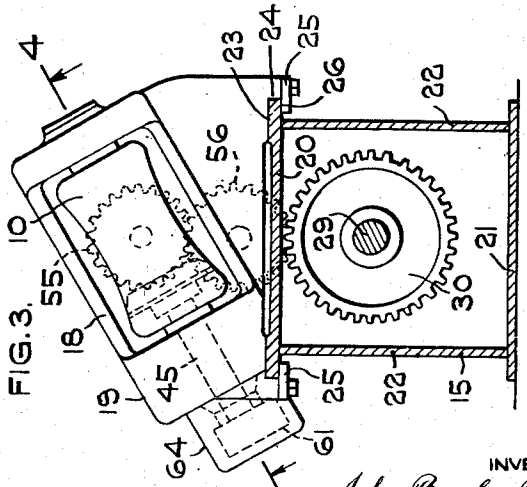


FIG. 3.

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MACHINE FOR STRAIGHTENING RODS OR TUBES

Filed Feb. 24, 1949 3 Sheets-Sheet 2

FIG. 2.

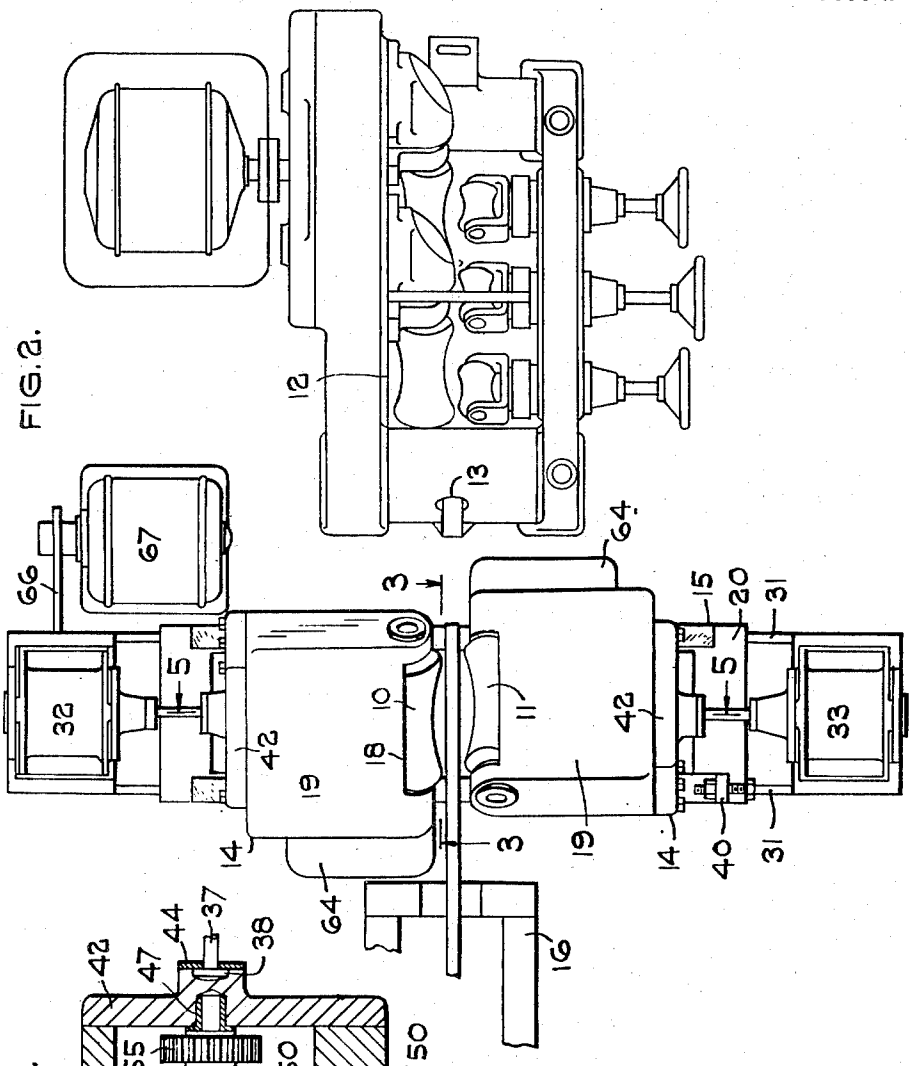
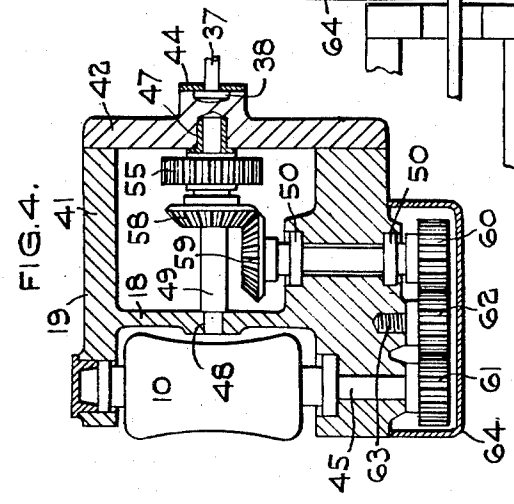


FIG. 4.



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Aug. 1, 1950 J. B. PICTON ET AL 2,517,344

MACHINE FOR STRAIGHTENING RODS OR TUBES

Filed Feb. 24, 1949 3 Sheets-Sheet 3

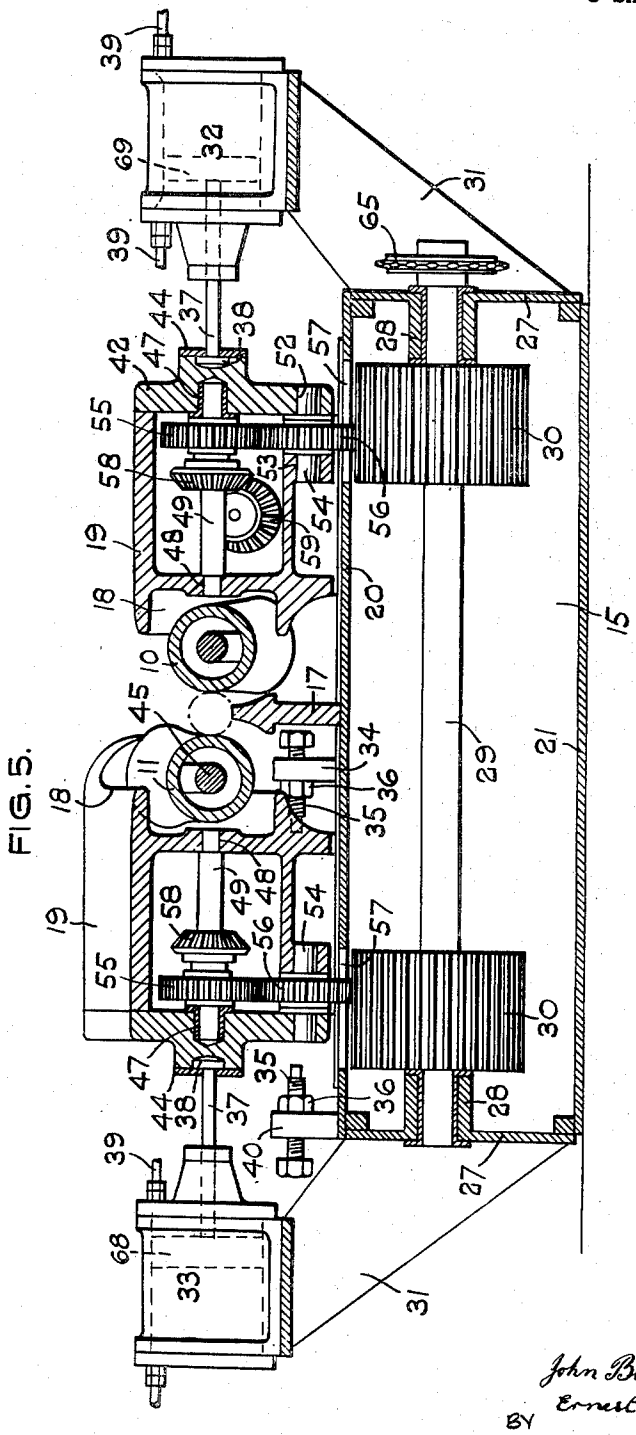


FIG. 5.

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2,517,344

UNITED STATES PATENT OFFICE

2,517,344

MACHINE FOR STRAIGHTENING RODS OR TUBES

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Application February 24, 1949, Serial No. 78,072
In Great Britain February 27, 1948

4 Claims. (Cl. 153—60)

1

This invention relates to machines for straightening rods or tubes of the kind in which the rods or tubes are passed endwise between one or more pairs of rotating straightening rolls.

The invention is particularly applicable but not restricted to that kind of machine in which the rod or tube is passed between a plurality of pairs or groups of skew rolls formed with concave peripheries, the pairs or groups of rolls being spaced apart in the direction in which the work is moved, and the machine usually incorporating one or more pressure rolls acting on the work to produce pressure thereon in a direction at right angles to its travel. In such a machine the rod or tube has imparted to it a helical motion, i. e. a combined rotary and endwise motion, as it passes through the machine.

It is usual to feed the work into the straightening machine by hand, the work being placed in a supporting cradle arranged in line with the pass, this cradle allowing of limited lateral movement to the work in any direction, and the operator pushing the leading end of the work into the pass between the straightening rolls. In this operation there is a period of some danger to the operator between the moment when the leading end of the work encounters the first pair or group of rolls and the moment when the leading end of the work has been engaged by a subsequent pair or group of straightening rolls. A similar period of danger occurs when the work is leaving the machine and is still engaged by the last pair or group of rolls. During these periods of danger it sometimes happens that a whirling action may be imparted to the work, causing injury to the operator.

The object of the present invention is to provide an improved construction of machine whereby the work can be fed into and/or removed from the straightening rolls without danger to the operator.

According to the present invention we provide at the feed end or at the delivery end or at both ends of the machine, a pair of driven skew rolls each having a concave periphery and arranged at opposite sides of the work, these rolls operating as feed or extraction rolls and imparting the same helical motion to the work as will be produced by the straightening rolls, so that the work is fed into or delivered from the straightening mechanism by the said skew rolls, these rolls being mounted so that they can be moved toward and away from the axis of the work pass whereby they can be moved apart to allow the leading end part of the work to be placed or to pass between them, and can then be made to approach

2

the said axis so as to grip the work and feed it into the straightening rolls or to grip the work as it is leaving the machine.

The feed or extraction rolls may be independent of the straightening mechanism and may be mounted adjacent that end of the supporting or a receiving cradle which is near to the straightening mechanism. Alternatively however, the first or last pair of straightening rolls may be used as feed or extraction rolls in which case they are mounted so that they can be moved towards and away from the axis of the pass whereby they can be moved apart to allow the leading end of the work to be inserted or to pass between them, and can then be made to approach the said axis so as to grip and drive the work.

Preferably both the feed or extraction rolls are movable at right angles to the axis of the work, and it is preferred to provide an adjustable stop to limit the movement of one feed or extraction roll towards the axis of the work. Further, the feed or extraction rolls may be advanced into the work-gripping position by pneumatic pressure, or by mechanical or hydraulic means, the arrangement being such that if mechanical means is provided for this purpose when the required grip has been obtained on the work elements are provided to enable the mechanical feed mechanism to slip.

The roll with which the adjustable stop co-operates is preferably subjected to a somewhat greater pressure towards the axis of the work than the other feed roller, so that by adjusting the stop in accordance with the diameter of the work the correct position of the work with its axis in line with the pass of the straightening rolls can be ensured, and the feed roll which has no stop may be subjected to rather less pressure than the other roll so that it cannot push the first roll out of the correct position.

The invention is illustrated in the accompanying drawings wherein:

Figure 1 is a view in side elevation showing the cradle in section.

Figure 2 is a plan view.

Figure 3 is a section on line 3—3 of Figure 2.

Figure 4 is a section on line 4—4 of Figure 3.

Figure 5 is a section on line 5—5 of Figure 2.

In the construction illustrated a pair of feed rolls 10, 11, are provided adjacent to the entrance end 13 of the straightening mechanism 12, and these feed rolls form part of a feed unit 14 mounted on a suitable support 15 between the supporting cradle 16 and the straightening mechanism 12.

The feed rolls 10, 11, are skew rolls arranged

on axes disposed in spaced parallel planes, the axes being inclined to one another. Between the feed rolls we may provide a work support 17 which is adjustable in an up-and-down direction.

The shaft of each feed roll is supported in a fork 18 formed at the end of a housing 19 containing driving gear, and these housings are slidably mounted upon a supporting gear, and these housings are slidably mounted upon a supporting guide plate 20 which forms the top of the support 15, which guide is disposed at right angles to the pass. The support 15 is of boxlike form and comprises a base 21, sides 22 and the top plate 20 which extends beyond the side members 22 at both edges. The housings 19 are slidably mounted on the top plate 20 and engage the top surface thereof at 23 and the edges at 24. Further, the housings are provded with detachable plates 25 which engage the under surfaces 26 of the laterally projecting portions of the plate 20.

The support 15 also incorporates end plates 27 provided with bearings 28 for a shaft 29 upon which are mounted two long gear wheels 30. Each end plate 27 is provided with an upwardly extending bracket 31 and mounted on these brackets are pneumatic cylinders 32, 33.

These pneumatic cylinders 32, 33 and pistons 69, 68 respectively within them are provided for sliding the two housings 19 towards each other. One of the housings 19 co-operates with an adjustable stop 34 which is mounted on the support and which is formed as a screw 35 which can be locked by a lock nut 36. This adjustable stop limits the movement of this housing towards the axis of the work, and in practice the stop is adjusted in accordance with the diameter of the work.

The two housings 19 can be advanced towards each other by pneumatic pressure admitted to cylinders acting upon pistons, the piston rods 37 of which are connected by heads 38 to the ends of the housings. The housing which co-operates with the stop 34 is acted upon by a pneumatically operated piston 68 which is of slightly larger diameter than the piston 69 of the other pneumatic element, and both pneumatic elements are fed with compressed air by pipes 39 from the same source. The pneumatic elements may be double acting so that they can be used for sliding the housings apart, as well as for sliding them towards each other to grip the work, and in conjunction with the housing 19 which co-operates with the adjustable stop a second adjustable stop 40 adapted to engage the opposite end of the housing may be provided for limiting the return movement of the housing. The stop 40 is similar to the stop 34.

Each of the housings 19 comprise a main body 41 for receiving the head 38 which is retained in position by a plate 44. At the opposite end each body is formed as a fork 18 in which is mounted a shaft 45 carrying one of the rollers 10 or 11. The body 41 is further provided with bearings 47, 48 for a shaft 49 and with a bearing 50 for a shaft 51. The end plate 42 is provided with a bearing 52 and the body with a bearing 53 for a shaft 54.

Each housing 19 contains one of the shafts 49 which are at right angles to the axis of the work which passes between the rolls, and each of these shafts is provided with a gear-wheel 55 gearing with a further gearwheel 56 on the shaft 54, which gearwheel projects through the lower side of the housing and through a slot 57 in the support, these gearwheels 56 engaging the long driving gearwheels 30 on the shaft 29 extending through the support 15. This driving shaft 29 is provided with the long gearwheels 30, one for each of the gears 56 in the housing, and the driving gearwheels are of a length which permits the sliding movement of the housings to take place without interrupting the drive.

Each of the shafts 49 is provided with a bevel wheel 58 engaging a bevel wheel 59 on the transverse shaft 51 extending through the side of the housing body, these shafts 49, 51 being in planes parallel to the pass, and on the exterior of the housing is further gearing connecting in each case a gear wheel 60 on the transverse shaft 51 with a gearwheel 61 on the shaft 45 of the feed roll. An intermediate gearwheel 62 mounted in a pin 63 attached to the housing body is used between the wheels 60 and 61. This gearing is enclosed in a cover 64.

The axes of the rollers 10 and 11 are inclined to each other and to the axis of the work and the axis of each of the rollers 10 and 11 is parallel to the axes of the straightening rolls on the same side of the shaft. Moreover the rolls 10 and 11 are driven at the same peripheral speed as the driven rolls of the straightening machine.

The shaft 29 is provided with a sprocket 65 which is connected by a chain 66 to a sprocket on the driving shaft of a driving motor 67.

In the construction shown the unit incorporating the rolls 10 and 11 is placed at the feed end of the straightening machine which is shown at 12. If it is intended to use a unit for extracting the work from the straightening machine then a unit similar to that shown is placed at the delivery end of the straightening machine or a unit such as that shown can be used at the delivery end only.

Instead of providing a separate unit for driving the work either at the feed end or the delivery unit, the pair of straightening rolls either at the feed end or at the delivery end of the straightening machine may be used instead, in which case the said rolls will be mounted and driven in a manner similar to that described with reference to the rolls 10 and 11.

If required, each feed roll may be adjustable about an axis at right angles to its length and intersecting with its axis midway between its ends.

In operation, the housings are moved apart sufficiently to enable the leading end of the work to be placed on the work support between the feed rolls. Compressed air is then admitted to the pneumatic cylinders, causing the housings to approach each other. One housing, which is subjected to the greater pressure moves up to the adjustable stop, in which position the periphery of its feed roll engages one side of the work. The other housing also moves towards the work until the periphery of its feed roll presses against the work. The work is now gripped between the two feed rolls, which can be set in action by setting the driving shaft in motion, and the work is then fed helically by the feed rolls in the straightening mechanism. The feed rolls are at opposite sides of the work and they are driven in a direction which imparts combined rotary and endwise movement to the work, so that the work is fed into the straightening rolls at the same rotary and endwise speed and in the same direction as those produced by the straightening rolls without any possibility of a whirling movement being transmitted to the work.

What we claim then is:

1. Feed mechanism for feeding work into or out of a straightening machine in which the work is straightened by passing it through a system of skew rolls comprising a support having a supporting guide disposed at right angles to the work, a pair of housings slidably mounted on said supporting guide, each of said housings having means carrying a feed roll, pneumatic cylinders mounted on the support parallel to said supporting guide, a piston in each cylinder, each of which pistons has a piston rod projecting from the cylinder and engaging one of said housings, one of said pistons and cylinders being of larger diameter than the other, an adjustable stop on the support for limiting the movement of the housing upon which the larger piston acts, towards the axis of the work, means for driving said feed rolls and means on said support for supporting the work between said feed rolls.

2. Feed mechanism for feeding work into or out of a straightening machine in which the work is straightened by passing it through a system of skew rolls comprising a support having a supporting guide disposed at right angles to the work, a pair of housings slidably mounted on said supporting guide, each of said housings having means carrying a feed roll, pneumatic cylinders mounted on the support parallel to said supporting guide, a piston in each cylinder, each of which pistons has a piston rod projecting from the cylinder and engaging one of said housings, one of said pistons and cylinders being of larger diameter than the other, an adjustable stop on the support for limiting the movement of the housing upon which the larger piston acts towards the axis of the work and an adjustable stop on the support for limiting the movement of the said housing away from the axis of the work, means for driving said feed rolls, and means on said support for supporting the work between said feed rolls.

3. Feed mechanism for feeding work into or out of a straightening machine in which the work is straightened by passing it through a system of skew rolls comprising a box-like support having a slotted guide plate disposed at right angles to the work, the ends of said support having bearings, a driving shaft in said bearings, gear wheels on said driving shaft, a pair of housings slidably mounted on said supporting guide, each of said housings having means carrying a feed roll, power operated means for moving said housings on said guide towards and away from each other, each of said housings containing a transmission shaft disposed parallel to the driving shaft, a gear wheel on each of these transmission shafts, each of said housings having an opening in the side adjacent the guide plate and a further shaft adjacent to said opening and parallel to the driving shaft, gear wheels on each of said further shaft and on the transmission shafts, the gear wheels on said further shafts being located in the openings in the bearings and projecting through the slots of the guide plate and engaging the gear wheels on the driving shaft and the gear wheels on said transmission shafts, further gearing on each housing for driving each feed roll from the transmission shaft in the housing, and means on said support for supporting the work between said feed rolls.

4. Feed mechanism for feeding work into or out of a straightening machine in which the work is straightened by passing it through a system of skew rolls comprising a box-like support having a slotted guide plate disposed at right angles to the work, the ends of said support having bearings, a driving shaft in said bearings, gear wheels on said driving shaft, a pair of housings slidably mounted on said supporting guide, each of said housings having means carrying a feed roll, power operated means for moving said housings on said guide towards and away from each other, gearing carried by said housings for driving said feed rolls, said gearing including a gear wheel projecting through one of the slots in the guide plate and engaging one of the gear wheels on the driving shaft and means on said support for supporting the work between said feed rolls.

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