Jan. 2, 1968 F. UNGERER 3,360,976

APPARATUS FOR ROTATING CYLINDRICAL STOCK

Filed Aug. 10, 1965

Fig. 1

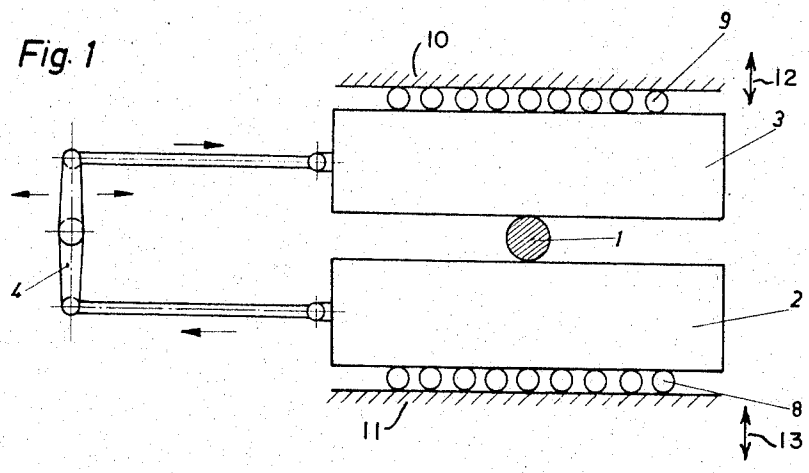



Fig. 2

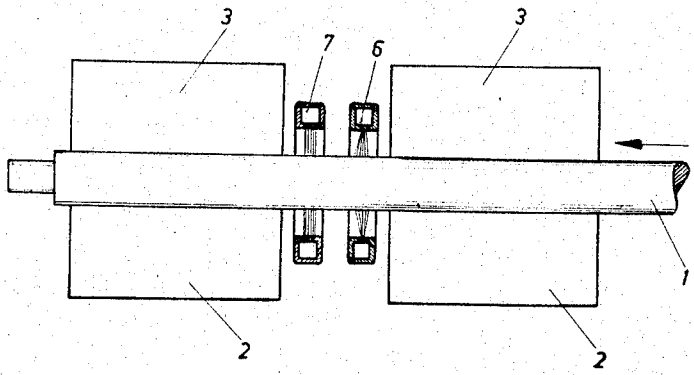
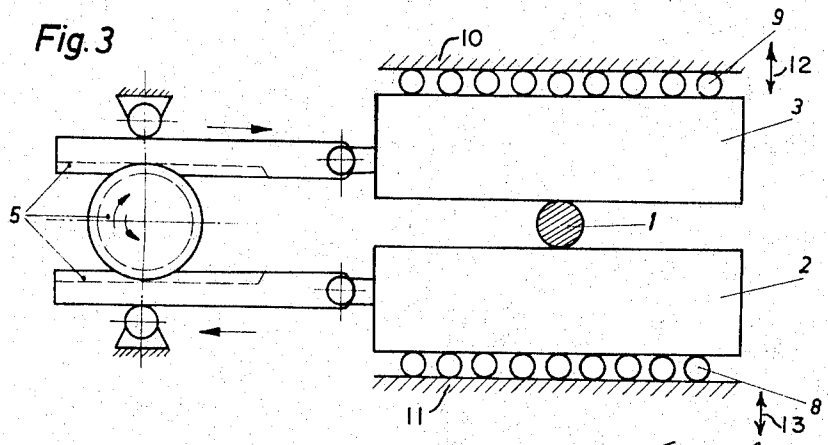



Fig. 3




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# APPARATUS FOR ROTATING CYLINDRICAL STOCK

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## ABSTRACT OF THE DISCLOSURE

An apparatus for rotating cylindrical stock comprising oppositely arranged pressure plates which are movable in parallel planes relative to each other.

This invention relates to an apparatus for rotating cylindrical stock, particularly straightening rolls, while the stock is being hardened.

It is known to feed cylindrical stock, such as shafts and rolls, particularly straightening rolls, through heating and cooling zones while the cylindrical stock is being rotated and supported and guided at both ends by two sets of three rolls. Such an arrangement is disclosed in the German patent specification 882,098. In this arrangement, hardening is effected by heating with an annular burner and subsequent quenching with annular nozzles while the workpiece is being rotated. It is difficult and expensive to construct the sets of three rolls at both ends of the stock, particularly because hyperbolic pairs of rolls are preferred.

These disadvantages are eliminated in a simple manner in that top and bottom pressure plates, which are movable in mutually opposite directions, are provided beyond opposite ends of the heating and cooling zones and serve for guiding and supporting the cylindrical stock to be hardened, and the bottom and top pairs of plates, or only the top pair of plates, are arranged to be moved in synchronism. This arrangement results in a continuous rotation of the cylindrical stock while the same is being fed through the hardening zone and is supported closely beside said zone. The feeding of the workpiece between the pressure plates may be effected hydraulically or by pusher racks or the like.

The vertically adjustable pressure plates are preferably backed by rollers and may be movable in mutually opposite directions by a rocker lever, which is fulcrumed centrally of the plates, or by a rack and pinion drive, as will be explained more fully with reference to the drawing, in which:

FIGS. 1 and 2 are a side elevation and top plan view, respectively, showing a first embodiment; and

FIG. 3 is a side elevation showing another embodiment.

As is apparent from the drawing, the cylindrical stock **1** is mounted between two top and two bottom pressure plates **2** and **3**. These pressure plates are moved in mutually opposite directions by means of rocker levers **4** (FIG. 1) or by a rack and pinion drive **5**. The two top plates are moved in synchronism with each other and so are the two bottom plates. This results in a rotation of the stock **1** to be hardened. This stock is simultaneously pushed hydraulically or by means of pusher racks in its longitudinal direction through the heating and cooling zones, which are defined, e.g., by annular flame nozzles **6** and annular water nozzles **7** between the supporting plates disposed beyond opposite ends of said zones. The pressure plates are mounted on rollers **8** and **9** supported by supports **10** and **11** respectively and are vertically adjustable for adjustment to the diameter of the cylindrical stock **1** by movement of supports **10** and **11** in direction of arrows **12** and **13**.



Instead of a movement of the top and bottom pressure plates **3** and **2** in mutually opposite directions, a reciprocating movement may be adopted, which is imparted only to the top pressure plates **3**. In this case the stock to be hardened **1** is not rotated on a stationary axis but is laterally reciprocated at the same time so that the flame and spray nozzles must follow its movement. In this arrangement the stock to be hardened **1** is supported up to a point which is in close proximity of the hardening zone and a deflection of such stock is reliably prevented. The total structure and drive means of the machine according to the invention is relatively simple.

What is claimed is:

**1.** Apparatus for rotating cylindrical stock which is longitudinally moving through a hardening zone, said apparatus comprising a top pair of pressure plates, which are mounted beyond opposite ends of said zone, a bottom pair of pressure plates, which are mounted beyond opposite ends of said zone under said top pair of pressure plates and vertically spaced therefrom, and means for moving the pressure plates of said top pair in synchronism with each other parallel to and relative to the pressure plates of said bottom pair.

**2.** Apparatus as set forth in claim **1**, which comprises means for moving said pressure plates of said bottom pair in synchronism with each other and with the pressure plates of said top pair and in a direction opposite to the movement of the pressure plates of said top pair.

**3.** Apparatus as set forth in claim **2**, in which the pressure plates of at least one of said pairs are vertically adjustably mounted relative to the pressure plates of the other of said pairs.

**4.** Apparatus as set forth in claim **2**, in which said means for moving the pressure plates of said two pairs comprise rocker lever means, which have a fulcrum disposed in a horizontal plane extending centrally between said top and bottom pairs of pressure plates and one end of which is coupled to one of said pairs of pressure plates whereas the other end of said lever means is coupled to the other of said pairs of pressure plates.

**5.** Apparatus as set forth in claim **2**, in which said means for moving said two pairs of pressure plates comprise top rack means pivotally connected to said top pair of pressure plates, bottom rack means pivotally connected to said bottom pair of pressure plates, and pinion means in mesh with both said rack means.

**6.** Apparatus as set forth in claim **2**, which comprises top roller means engaging the top of said pressure plates of said top pair and bottom roller means engaging the bottom of the pressure plates of said bottom pair.

**7.** Apparatus for hardening cylindrical stock, which comprises means defining a hardening zone, and apparatus for rotating cylindrical stock which is longitudinally moving through said hardening zone, said apparatus comprising a top pair of pressure plates, which are mounted beyond opposite ends of said zone, a bottom pair of pressure plates, which are mounted beyond opposite ends of said zone under said top pair of pressure plates and vertically spaced therefrom, and means for moving the pressure plates of said top pair in synchronism with each other parallel to and relative to the pressure plates of said bottom pair.

**8.** Apparatus for treating cylindrical stock, which comprises means defining a treating zone, and apparatus for rotating cylindrical stock which is longitudinally moving through said treating zone, said apparatus comprising a

top pair of pressure plates, which are mounted beyond opposite ends of said zone, a bottom pair of pressure plates, which are mounted beyond opposite ends of said zone under said top pair of pressure plates and vertically spaced therefrom, and means for moving the pressure plates of said top pair in synchronism with each other parallel to and relative to the pressure plates of said bottom pair.



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