June 3, 1924. 1,496,463

L. IVERSEN

ROLLING MILL

Filed Nov. 22, 1920

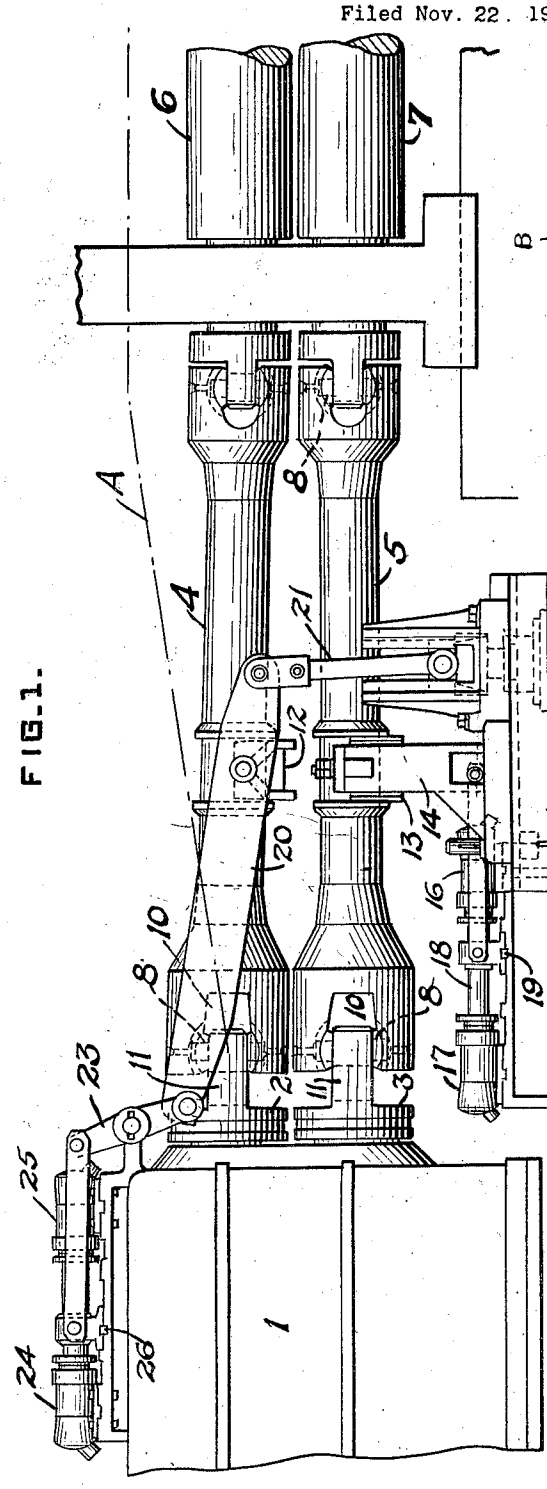


FIG. 1.

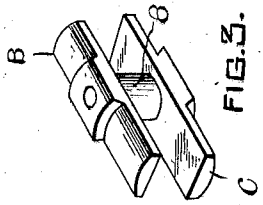


FIG. 3.

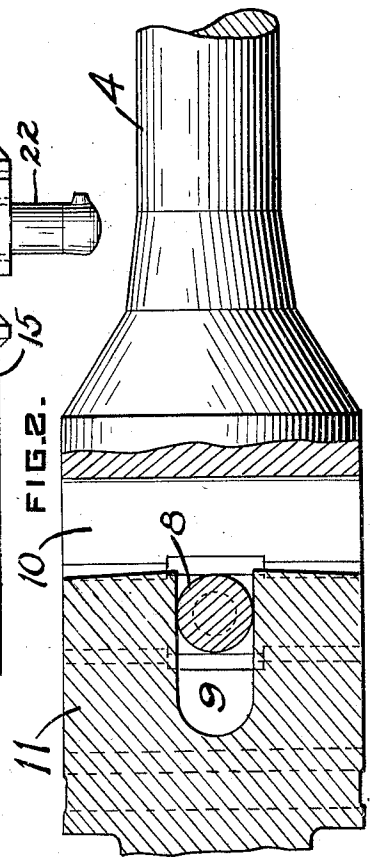


FIG. 2.

INVENTOR

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UNITED STATES PATENT OFFICE.

LORENZ IVERSEN, OF PITTSBURGH, PENNSYLVANIA.

ROLLING MILL.

Application filed November 22, 1920. Serial No. 425,636.

To all whom it may concern:

Be it known that I, LORENZ IVERSEN, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have made a new and useful Invention in Rolling Mills, of which the following is a specification.

My invention relates to rolling mills and consists in an improved connection between the mill spindles and their rolls and driving pinions, and in the spindle mounting.

The main object of my invention is to decrease the time required to change the rolls. As such time is entirely non-productive, it is important that the operation be as short and simple as possible.

Another object is to provide bearings for the mill spindles adapted to accommodate different positions of the spindles.

In a co-pending application, Serial No. 294,484, now Patent Number 1,359,601, granted November 23, 1920, I illustrate and claim a universal coupling including a novel coupling unit utilized in the mechanism illustrated in the accompanying drawings, in which Figure 1 is an elevation of a mill equipped with my invention, and Fig. 2 is a horizontal section through the joint between one of the spindles and its respective pinion and is drawn on an enlarged scale.

Fig. 3 is an isometric view of a detail of the universal coupling set forth and claimed in my aforementioned application. The mill driving pinions are enclosed in a housing 1 from which the pinion necks 2 and 3 extend and, by means of spindles 4 and 5, are connected to their respective rolls 6 and 7.

The requisite universal joint between each spindle and the pinion or roll includes a tongue on the pinion or roll, a recess in the spindle adapted to receive the tongue and a coupling unit for pivotally securing the tongue in the groove to prevent relative transverse movement and the resulting disassembly of the spindle and pinion or roll. This unit, as more fully described in the above-mentioned application, includes a pin element 8 which extends across the spindle recess and is received in a slot 9 in the tongue member.

As shown in Fig. 3, the pin 8 is rigidly secured to two opposed segmental members B and C. The unit is mounted in a segmental cylindrical recess D, as shown in Fig. 1, so that it is capable of turning to accommodate itself to the misalignment of the spindle and the pinion or roll.

In the joint between the pinion and spindle, the recesses 10 extend inwardly some distance beyond the coupling unit. Similarly, the shoulders of the tongues 11 on pinions 2 and 3 are cut back some distance from the end of their respective spindles. This construction enables each spindle to be moved towards its pinion far enough to entirely separate the opposite end of the spindle from its respective roll permitting the latter to be removed and replaced by another roll which, in turn, may be connected to the spindle by merely shifting the latter to the right.

It will be understood that the enlarged recess and elongated tongue may be located at either end of the spindle or at both ends, also that the tongue may be located on the spindle and the recess on the adjacent element, but the construction and relative positions shown are preferred.

The above-described arrangement of the couplings avoids the lifting or transportation of the spindles whenever the rolls are changed and results in a material saving of time.

To shift the spindles to and fro as described and to relieve the roll and pinion bearings of the weight of the spindles are the functions of the movable bearings 12 and 13 and their associated mechanism.

The lower spindle 5 is supported at 13 by a bearing, the stand 14 of which is slidably mounted on a base plate 15. Hydraulic cylinders are indicated at 16 and 17 and their common piston stem 18 is linked to the bearing stand 14 so that, by admission of fluid to the proper cylinder, the stand, bearing and spindle are shifted as desired. A key 19 locks the bearing stand in the position indicated to avoid undesired shifting of the spindle.

The upper spindle bearing 12 is mounted on a lever 20 pivotally supported by a pitman 21, mounted on the piston rod of a hydraulic cylinder 22, and by a link 23 fulcrumed on housing 1 and adapted to be operated by hydraulic cylinders 24 and 25. Admission of fluid to one of the latter cylinders will shift the upper spindle 4 without depriving it of its bearing support as the fluid pressure in cylinder 21 will accommodate the resulting displacement of the piston. This construction also accom-

modates variations in the position of spindle 4 in the vertical plane of its axis, for instance when moved to the position indicated by the dot-and-dash line A.

Key 26 locks spindle 4 against longitudinal shifting without affecting the operation of the vertical adjustment.

It is obvious that, by use of the shifting mechanism described, the handling of the spindles is rendered a matter of seconds and may be controlled by one man. While I have illustrated hydraulic operating and supporting mechanism, I contemplate the substitution of effective equivalents for the cylinders and pistons shown.

Having described my invention and illustrated its preferred construction, I claim:

1. In a rolling mill, a driving pinion, a driven roll, a spindle connecting said pinion and roll, the joint between said pinion and said spindle being adapted to permit axial movement of said spindle towards said pinion sufficient to separate said roll and said spindle.

2. In a rolling mill, a driving pinion, a spindle driven thereby, a roll, a coupling unit providing a universal joint between said pinion and spindle; said unit, pinion and spindle being adapted to permit relative axial movement between said pinion and spindle sufficient to disengage said spindle from said roll.

3. In a coupling between a rolling-mill spindle member and the neck of a pinion or roll member, a unit secured in one of said members, a tongue on the other of said members adapted to be received in said unit and to transmit rotative movement therethrough, and a recess in the member containing said unit adapted to permit axial movement of said tongued member toward the other member.

4. In a rolling mill, a neck for a pinion or roll provided with a transverse slot having a recess, a coupling unit journaled in said recess and provided with a slot and a pin positioned transversely thereof, a spindle having a tongued end adapted to enter said first-mentioned slot and slotted to receive said pin; said first-mentioned slot and the slot in the tongued end of said spindle being continued beyond the extent required for normal operating assembly of said neck, unit and spindle to provide for telescoping movement of said neck and spindle.

5. In a rolling mill, spindles provided with universal couplings to their pinions and rolls, a spindle bearing slidably mounted, and means for sliding said spindle-carrier bearing axially.

6. In a rolling mill, a spindle, a slidably mounted spindle bearing, two horizontally mounted opposed hydraulic cylinders, a double ended plunger operated by said cylinders, and means for moving said spindle bearing by said plunger for the purpose of shifting said spindle.

7. In a rolling mill, a spindle adapted to be shifted axially to disconnect with its roll and to move in a vertical plane to accommodate vertical movement of its roll, a bearing for said spindle, means for shifting said bearing axially of said pinion and means for automatically adjusting the vertical position of said bearing to vertical movements of said spindle.

8. In a rolling mill, a spindle adapted to be shifted axially to disconnect it from its roll and to be moved vertically, a bearing for said spindle mounted upon a horizontal lever, a fluid pressure support for one end of said lever, and a horizontally movable pivotal support for the other end of said lever, and means for positively actuating said pivotal support.

In testimony whereof, I have hereunto subscribed my name this 19th day of November, 1920.

LORENZ IVERSEN.

Witnesses:
N. LEERBERG,
L. STOPHEL.