J. MOORE & J. FRITZ.

Improvement in Three High Rolls.

No. 124,370. Patented March 5, 1872

FIG. 2.

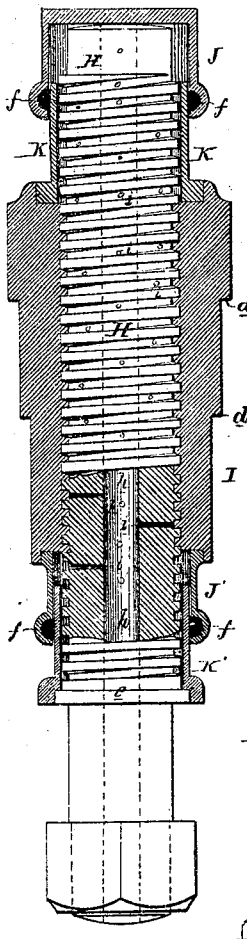


FIG. 1.

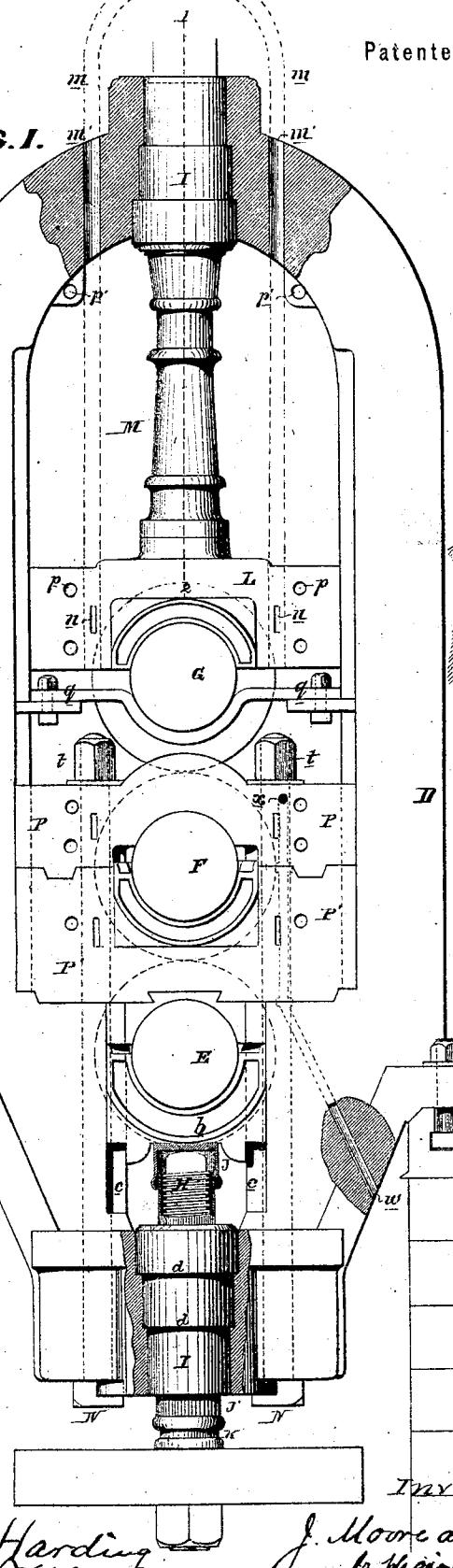
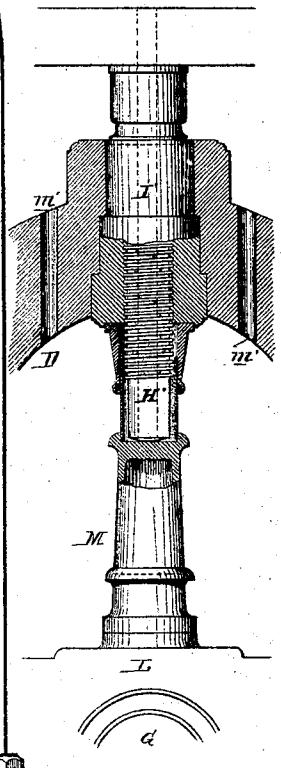


FIG. 3.



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UNITED STATES PATENT OFFICE.

JAMES MOORE, OF PHILADELPHIA, AND JOHN FRITZ, OF BETHLEHEM, PA.

IMPROVEMENT IN THREE HIGH ROLLS.

Specification forming part of Letters Patent No. 124,370, dated March 5, 1872.

SPECIFICATION.

We, JAMES MOORE, of Philadelphia, Pennsylvania, and JOHN FRITZ, of Bethlehem, county of Northampton, State of Pennsylvania, have invented certain Improvements in Three High Rolls, of which the following is a specification:

Nature and Object of the Invention.

Our invention consists of certain improvements in three high rolls, too fully explained hereafter to need preliminary description, the object of our invention being to render available in practice the plan heretofore attempted of making the highest and lowest of three high rolls adjustable, while the middle roll revolves in fixed bearings. Further objects of our invention are to facilitate the removal and replacing of rolls; also, thorough lubrication of the adjusting-screws, and the constant supply of the journals with water without resorting to the complex array of pipes heretofore used for that purpose.

Description of the Accompanying Drawing.

Figure 1 is an end view, partly in section, of a set of three high rolls with the frame or housing, and illustrating our improvements; Fig. 2, an enlarged vertical section representing the adjusting-screw and nut for the lower bearing; and Fig. 3, a vertical section of the upper portion of Fig. 1.

General Description.

A and A′ are the opposite sides of the foundation, to which are secured by bolts *a a* the base plates B B, for supporting the several frames or housings, in which the rolls have their bearings, one only, D, of these housings being shown in the drawing. E is the journal of the lowest roll, F that of the intermediate roll, and G that of the highest roll. The journal E revolves in a bearing, *b*, adapted to vertical guides *c c* formed in the housing and supported by a screw, the peculiar character and surroundings of which will be best understood by reference to the enlarged view, Fig. 2. The threads of the screw H are adapted to the internal threads of the nut I, which is fitted snugly and driven tightly into the lower end of the housing, until shoulders *d d* on the nut bear on corresponding ledges formed in the said housing, as clearly shown in Fig. 1. On the rounded upper end of the screw H bears a cap, J, arranged to fit snugly and slide freely on the cylinder K, the latter surrounding the screw, but being free from contact with the same, and being let into and secured to the top of the nut I. A cylinder, K′, rests on and is secured to a collar, *e*, at the lower end of the screw, and is arranged to slide in a cylinder, J′, secured to the under side of the nut. The cap J is provided with an internal packing, *f*, so as to effectually bar the access of any particles of dirt to the screw, and the same remark will apply to the packing of the cylinder J′.

It will be seen that the bearing *b* of the lower roll E rests directly on the cap J, the latter bearing on the rounded end of the screw, so that on turning the latter to raise or lower the bearing, the cap J will slide freely on the cylinder K, and accommodate itself to the varying height of the screw, the cylinder K′ below being similarly self-accommodating, the packing, however, in both cases maintaining the joints perfectly tight. This is an important feature of our invention, inasmuch as when the rolls are in operation particles of scale must fall from the iron as it is being rolled, and if these particles fell on an unprotected screw and adhered to its threads, it would soon become inoperative. In fact it is this protection of the lower screw by which the plan heretofore attempted of adjusting the bottom roll from below can be carried into practical effect. It may be remarked that the cap J may be arranged to slide within a cylindrical projection on the nut, and the cylinder K may be arranged to slide on the outside of the cylinder J′; but we prefer the plan described for reasons which will be obvious. It is most important that the heavy screws for controlling and adjusting the bearings of rolls should be always thoroughly lubricated, so as to prevent adhesion, which is apt to take place, and so as to be easily operated with the promptitude and facility which the circumstances require.

In order to insure and maintain a thorough lubrication, a central hole, *h*, is bored through the screw H, and smaller transverse holes *i* are bored in the screw between the threads at repeated intervals, so that oil injected into the

hole *h* by any suitable appliances may have access to the threads. A nut, I′, similar to that below, is fitted to the upper end of the housing, and its screw H′ is protected with packed self-accommodating cylinders in the same manner as the lower screw. The protection of the upper screw is not so important, however, as it is below, as it is not within the range of falling particles of scales; but we prefer to protect it; and, in fact, the screws of ordinary rolls, with the packed cylinders, as shown in Fig. 3, so that no particles agitated by draughts or falling from the roof of the mill, can gain access to the screw.

It will be observed that the housing or frame D is extended much higher above the rolls than usual, and that the upper screw H′ does not bear directly on the bearing L of the top roll, but that a pillar, *m*, intervenes between the two, for a purpose which I will now proceed to explain. It is necessary in many rolling-mills to repeatedly change the rolls, an operation which, as housings are usually made, demands much tedious labor, which it is the object of this part of my invention to dispense with. When it is desirable to remove the rolls shown in the drawing, the upper screw H′ is so far elevated as to release the pillar M, which is withdrawn. Rods *m*, suspended from an adjacent crane, are then lowered through holes *m′ m′* in the housing, and their ends passed into vertical holes in the bearing L of the upper roll, and temporarily secured thereon by transverse keys *n n*. By means of the rods the upper bearing is now hoisted to the termination of its guides in the housing, and by means of double hooks or dogs passed at one end into holes *p* in the bearing, and at the upper end, through holes in lugs *p′ p′*, the bearing L is suspended to the housing, and the roll G is at liberty to be removed in the usual manner. The detachable supports *q q* of the top roll are now removed from the housing. The nuts *t* of the bolts N, which confine the upper and lower bearings P and P′ of the middle roll F to the housing, are loosened and removed, the rods *m m* detached from the suspended bearing L by the withdrawal of the keys *n*, and the rods then lowered into the holes of the upper bearing P, and connected to the latter by the same keys, when this bearing is hoisted and suspended by hooks or links to the bearing L, already suspended to the housing. The middle roll is now removed, the rods *m m* lowered, as before, connected to the bearing P′, which is hoisted and suspended to the other suspended bearings, and the middle and lower roll can now be removed.

It will now be seen without further explanation what facilities this part of our invention affords for the ready removal of the rolls, and it will be unnecessary to explain how readily other rolls may be substituted for those removed and adapted to their bearings ready for use.

It is usual to suspend above rolling-mills an intricate system of water-pipes, so that constant streams of water may play on the revolving journals. These pipes are frequently in the way, and are often damaged by the hurried movement of masses of iron and implements which accompany rolling-mill operations. In order to dispense with these pipes we form in the lower portion of each housing a passage, *w*, which communicates with a similar vertical passage formed in the upper and lower bearings P and P′ of the middle roll, as shown by dotted lines in Fig. 1, the passage terminating at an orifice, *x*, in the said upper bearing. A constant supply of water is introduced below into the passage *w*, and may be distributed to the three journals through short pipes communicating with the orifice *x*, the usual array of suspended pipes being thus dispensed with.

In three high rolls of the usual construction the lowest roll revolves in fixed bearings, the bearings of the middle and upper rolls being adjustable vertically; hence the bearing of the lowest and highest roll must always be subjected to a strain at every pass of the metal, no matter whether the pass be between the upper and middle roll, or between the latter and the lower roll. Of the three high rolls described, however, the middle roll revolves in fixed bearings P and P′, which are firmly secured by bolts N N to the housings, so that in making a pass between the middle and lower rolls, the bearings of these rolls only receive the strain from which the bearing of the upper roll is entirely free. In like manner when the pass is made between the top roll and middle roll, the bearings of the lower roll are free from all strain; hence it will be seen that the strain on the rolls and on their bearings is more evenly distributed by the above-described arrangement than in ordinary three high rolls. There are other advantages in this arrangement which those familiar with rolling-mill machinery will readily understand without explanation. This arrangement, which has been heretofore attempted, cannot be carried into practical effect without properly protecting the lower screw, and this we have accomplished thoroughly by the system of self-accommodating slides described above.

It may be remarked that the manner of fitting the adjustable and fixed bearings of the rolls to the housing does not differ materially from that usually adopted. It may also be stated that the extension in altitude of the housing and the interposition of a pillar or story between the upper screw and the bearing of the top roll, is an improvement which may be applied with advantage to other rolling-mills with the view of facilitating the removing and replacing of the rolls. The movement of the upper and lower screws should be simultaneous, and this can be effected by different systems of gearing which it has not been deemed necessary to illustrate in the drawing.

We do not claim, broadly, three high rolls in which the lowest and highest rolls are ad-

justable, and in which the middle roll revolves in fixed bearings. We do not claim, broadly, the combination of the housing, screw, top bearing, and movable block, as short blocks or steps for receiving the end of the screw have been used in such combinations; but

We claim—

1. The pillar *m*, arranged between the top bearing L and the screw, and of such a length that when removed the said bearing can be elevated sufficiently to permit the withdrawal of the roll, as described.

2. The combination, in a rolling-mill, of the screw H for adjusting the roll-bearings, and a cap, J, fitted to the nut or to an attachment thereto, so as to rise and fall with the screw without exposing any portion of the latter.

3. The combination, in a rolling-mill, of the screw H, the flange *f*, and the hollow cylinder K′, as and for the purpose described.

4. The tubular screw, having transverse holes for the passage of lubricant to the nut, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JAMES MOORE.

Witnesses: J. FRITZ.

JACOB R. MASSEY,

JOHN R. WINCHESTER.