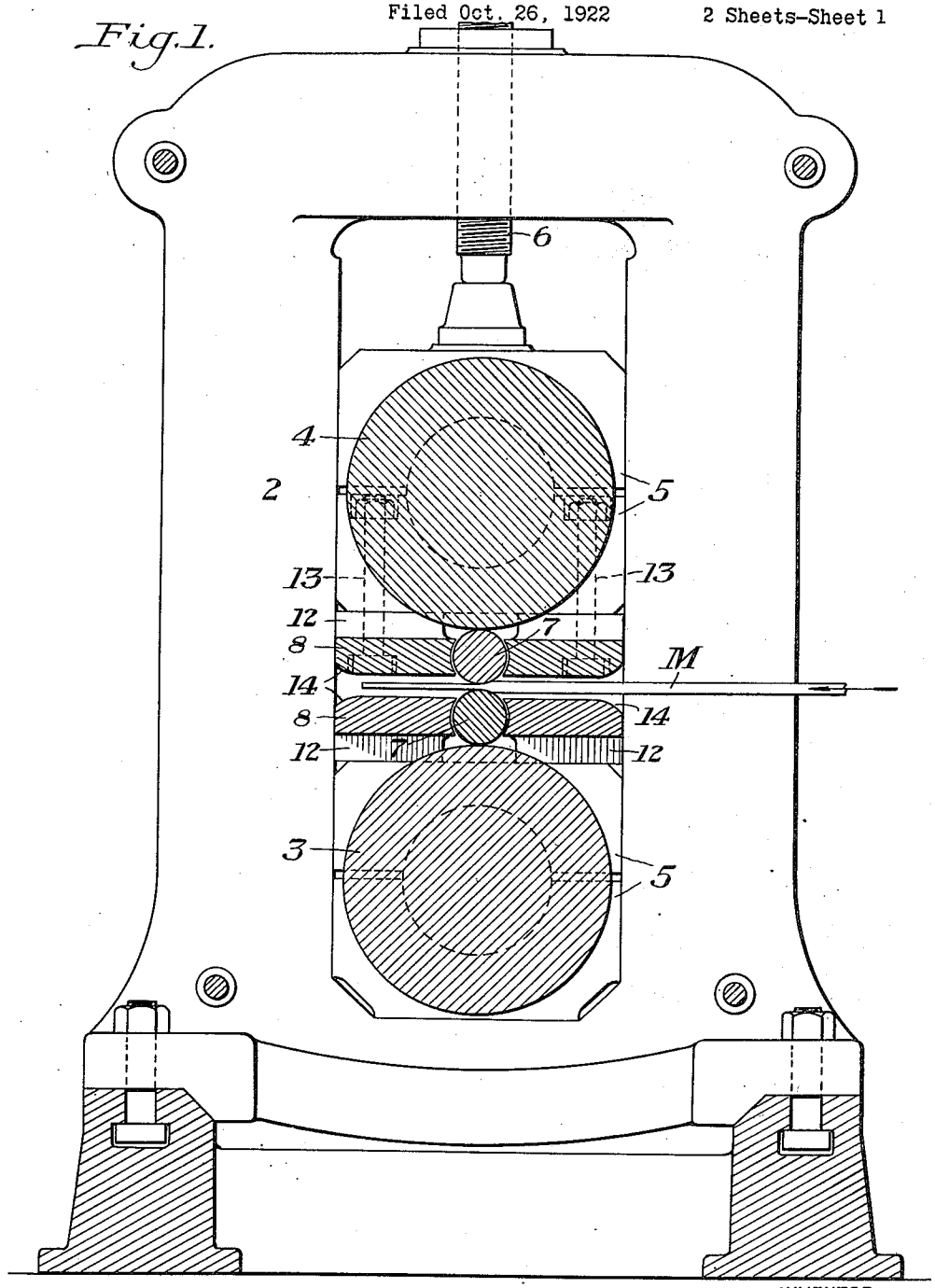
March 15, 1927. 1,621,284

E. E. SLICK

ROLLING MILL

Filed Oct. 26, 1922 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

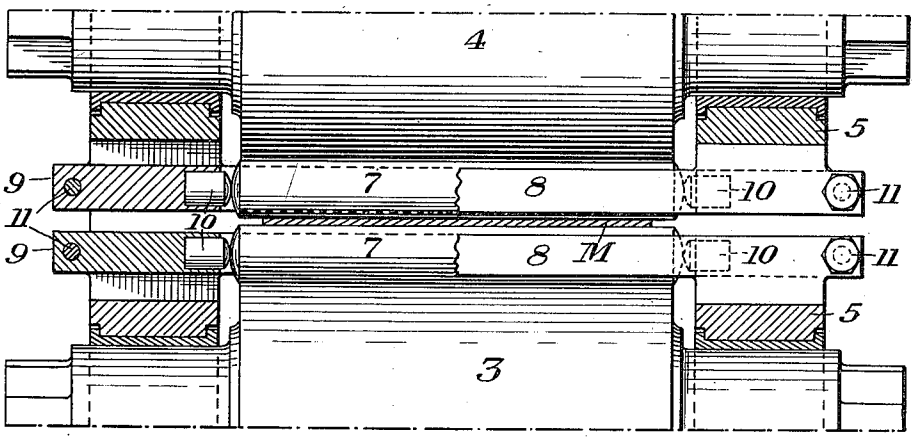


Fig. 3.

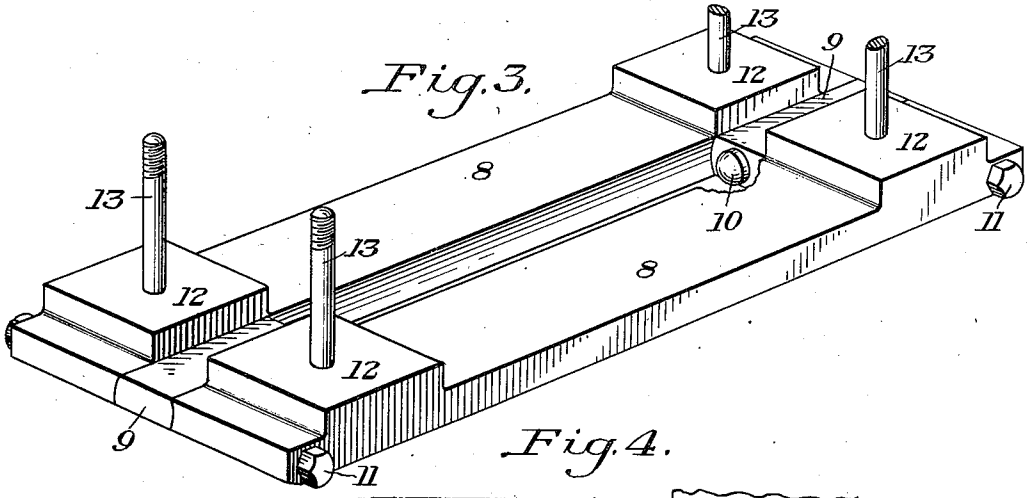
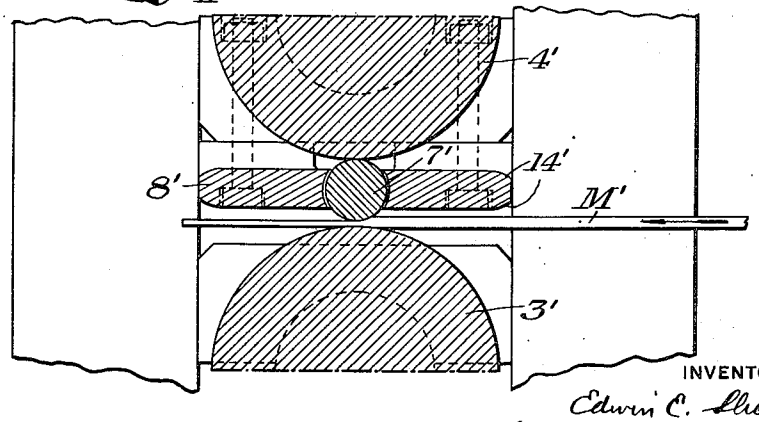


Fig. 4.



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Patented Mar. 15, 1927. 1,621,284

UNITED STATES PATENT OFFICE.

EDWIN E. SLICK, OF PITTSBURGH, PENNSYLVANIA.

ROLLING MILL.

Application filed October 26, 1922. Serial No. 597,077.

The present invention relates broadly to rolling mills, and more particularly to rolling mills of the type adapted to roll sheets, strips and the like.

It has heretofore been proposed in the art to which this invention relates to provide rolling mills with supporting rolls of comparatively large diameter, and an intermediate work roll, or plurality of rolls, of smaller diameter adapted to give more nearly a line contact with the material being rolled. This result has heretofore been obtained by either providing supporting bearings for the smaller work rolls, or by providing a plurality of lower supporting rolls adapted to support the work roll therebetween.

Due to the roll spring, increased friction, and the like, constructions in which the intermediate rolls have been directly journaled in the roll housings have been more or less objectionable. Also, the use of a plurality of lower rolls considerably increases the friction, as well as the cost of construction and up-keep.

In order to obviate the objections to mills of the type generally used, this invention provides an intermediate work roll or plurality of work rolls which are supported in such manner that the use of independent roll necks and bearings is not required, effective lateral support for the work rolls is provided, and the use of additional supporting rolls is rendered unnecessary.

In the accompanying drawings, there is shown for purposes of illustration only a preferred embodiment of this invention, it being understood that the drawings do not define the limits of this invention as changes may obviously be made in the construction and operation herein disclosed without departing from the spirit or scope of the broader claims.

In the drawings—

Figure 1 is a vertical sectional view through a roll stand embodying the present invention;

Fig. 2 is a partial side elevation, partly broken away and partly in section, of a portion of the construction illustrated in Fig. 1;

Fig. 3 is a perspective view, partly broken away, illustrating one form of work roll support, and

Fig. 4 is a vertical sectional view illustrating a modified arrangement of rolls.

It is well recognized by those skilled in the art that for certain purposes it is desirable to provide as small an area of contact with the material being operated upon as possible. The accomplishment of this result, however, is accompanied with difficulties due to the fact that the intermediate rolls of small diameter, where such a construction is employed, must be maintained in operative position so as to insure a minimum of roll spring and a minimum of friction. This result may be accomplished as disclosed more particularly in the drawings by providing a roll stand 2 of any usual construction having a lower roll 3 and an upper roll 4. The rolls 3 and 4, which may be termed the supporting rolls, are mounted in bearings 5 in the customary manner, and the upper roll may be maintained in position by a screw down 6.

The supporting rolls 3 and 4 are mounted in the roll housing with their axes located in substantially the same vertical plane. Between these rolls there are provided intermediate work rolls 7 of smaller diameter, which rolls also preferably have their axes in the plane of the axes of the supporting rolls, although they may be slightly offset, if desired.

The intermediate work rolls may be of any desired length, but preferably have a length which is approximately equal to the effective length of the supporting rolls intermediate the roll necks. For maintaining the work rolls in position, and affording a lateral support therefor, there may be provided intermediate supporting members. Each of these members may conveniently comprise side blocks 8 having a thickness less than the diameter of the work rolls, and held in spaced relationship by blocks 9. The opposed inner surfaces of the blocks 8 may be curved, or otherwise shaped, to substantially conform to and effectively co-operate with the sides of the work rolls to prevent lateral displacement thereof. For preventing endwise displacement of the end rolls, the blocks 9 may be formed or provided with thrust bearings 10. It will be apparent that after the work rolls are mounted in position within the supporting members, the respective parts thereof may be held together by transversely-extending bolts 11.

Any convenient means for holding the supporting members in position may be pro-

vided, but I have found it desirable to form the same with thickened portions 12 adjacent the opposite ends adapted to directly engage a portion of the roll neck bearing of the roll with which the supporting member directly co-operates. If desired, the upper supporting member may be secured to the lower bearing 5 for the upper supporting roll 4 as by bolts 13, whereby it is removable with the upper roll bearing.

In order to facilitate the entry of a piece of material M to be operated upon, as shown in Fig. 1, the opposed faces of the blocks 9 may be curved or cut away as indicated at 14. It will be apparent that the mill shown more particularly in Fig. 1 of the drawings is of the reversing type in which the material is passed first in one direction and then in the other, although the mill may obviously be used for continuously rolling if so desired.

In Fig. 4 of the drawings, there is illustrated an arrangement which may expeditiously be used in a manner similar to the use of three high mills of usual construction. In this arrangement there is provided a single work roll 7′ intermediate the lower supporting roll 3′ and the upper supporting roll 4′. The work roll, however, may be held in position by a supporting member of the character heretofore described, this member preferably having curved or cut away portions 14′ on both sides thereof to facilitate entry of the material M′ either above or below the work roll.

From the foregoing, it will be apparent that there is provided a rolling mill in which it is possible to obtain the advantages inherent in the use of rolls providing a small area of contact either with one or both surfaces of the material being operated upon. The advantages of this invention arise particularly from the manner of supporting the intermediate work rolls whereby the use of roll necks thereon is obviated, the number of supporting rolls reduced to a minimum, and the possibility of lateral movement or roll spring materially decreased.

I claim:

1. In a rolling mill, upper and lower rolls, an intermediate roll, and means engaging said intermediate roll on substantially diametrically opposite sides thereof and between the ends of the working faces of the upper and lower rolls only for laterally supporting the same.

2. In a rolling mill, upper and lower rolls, an intermediate roll, and supporting means for said intermediate roll comprising spaced members within the area defined by the working faces of the upper and lower rolls only and adapted to engage the same on substantially diametrically opposite sides thereof throughout substantially its entire length.

3. In a rolling mill, a roll housing carrying upper and lower rolls, bearings for said rolls, an intermediate roll within and terminating short of said housing, and means cooperating with said bearings for supporting said intermediate roll.

4. In a rolling mill, a roll housing carrying upper and lower rolls, bearings for said rolls, an intermediate roll within and terminating short of said housing, and means co-operating with said bearings for supporting said intermediate roll, said means comprising spaced members engaging said roll on substantially diametrically opposite sides thereof throughout a substantial portion of its length and laterally supporting the same.

5. In a rolling mill, a roll housing carrying upper and lower rolls, bearings for said rolls, a supporting member extending between said rolls, parallel thereto and cooperating with said bearings, and an intermediate roll carried by said member and terminating short of said bearings.

6. In a rolling mill, a plurality of rolls of comparatively large diameter, an intermediate work roll of smaller diameter adapted to directly cooperate with either of said first mentioned rolls, the axes of all of said rolls being in a common plane, and means effective on opposite sides of said work roll and in substantially the median horizontal plane thereof for laterally supporting the same, substantially as described.

7. In a rolling mill, a plurality of rolls of comparatively large diameter, an intermediate work roll of smaller diameter and of less length than said first mentioned rolls, said intermediate roll being of substantially uniform diameter throughout its entire length, and means effective on opposite sides of said work roll for laterally supporting the same, substantially as described.

8. In a rolling mill, a plurality of rolls of comparatively large diameter, an intermediate work roll of smaller diameter, and means of less width than the diameter of said work roll and effective on opposite sides thereof for laterally supporting the same, said means being supported at its ends only, substantially as described.

9. In a rolling mill, a plurality of rolls of comparatively large diameter, an intermediate work roll of smaller diameter, means of less width than the diameter of the work roll engaging the body thereof for laterally supporting the same, means for preventing endwise movement of the work roll, and a housing having bearings for said rolls of large diameter only, substantially as described.

10. In a rolling mill, a plurality of rolls of comparatively large diameter, an intermediate work roll of smaller diameter and of a length substantially equal to the length of the working faces of said first mentioned rolls, means engaging the body of the work

roll for laterally supporting the same, and means for preventing endwise movement of the work roll, substantially as described.

11. In a rolling mill, a plurality of rolls of comparatively large diameter, an intermediate work roll of smaller diameter and rigidly mounted means of less width than the diameter of the work roll engaging the body thereof for laterally supporting the same, substantially as described.

12. In a rolling mill, a plurality of rolls of comparatively large diameter, an intermediate work roll of smaller diameter and of less length than said first mentioned rolls, and means engaging the body of the work roll only for laterally supporting the same, substantially as described.

13. In a rolling mill, a plurality of rolls of comparatively large diameter, an intermediate work roll of smaller diameter, all of said rolls having their axes in approximately the same plane, means of less width than the diameter of said working roll and effective throughout substantially the entire length thereof for laterally supporting the same, and a housing having bearings for the rolls of comparatively large diameter only, substantially as described.

14. In a rolling mill, a plurality of supporting rolls constructed without roll necks, a plurality of intermediate work rolls adapted to directly engage opposite sides of material being rolled, all of said rolls having their axes in the same plane, and means for laterally supporting said work rolls throughout the major portion of the length thereof, substantially as described.

15. In a rolling mill, a plurality of supporting rolls, a plurality of intermediate work rolls of less length than said supporting rolls and of substantially the same diameter throughout their entire length, all of said rolls having their axes in the same plane, and means for laterally supporting said work rolls throughout the major portion of the length thereof, substantially as described.

16. In a rolling mill, a plurality of rolls of comparatively large diameter, an intermediate work roll of smaller diameter than said first mentioned rolls, all of said rolls having their axes in substantially a common plane, means effective on opposite sides of said work roll for laterally supporting the same while permitting the passage of work above or below the same, and a housing having bearings for said rolls of comparatively large diameter only.

17. In a rolling mill, a plurality of supporting rolls, a plurality of intermediate work rolls, all of said rolls having their axes in the same plane, means for laterally supporting said work rolls throughout the major portion of the length thereof, and a housing having bearings for said supporting rolls only.

18. In a rolling mill, supporting rolls, an intermediate roll, a housing for said supporting rolls and having bearings for said supporting rolls only, and means carried by said housing and effective on said intermediate roll within the working zone of the supporting rolls for maintaining the intermediate roll in the desired position.

In testimony whereof I have hereunto set my hand.

EDWIN E. SLICK.