June 23, 1931. R. KRONENBERG 1,811,586

ROLLING MILL

Filed Aug. 28, 1929 3 Sheets-Sheet 1

Fig.1.

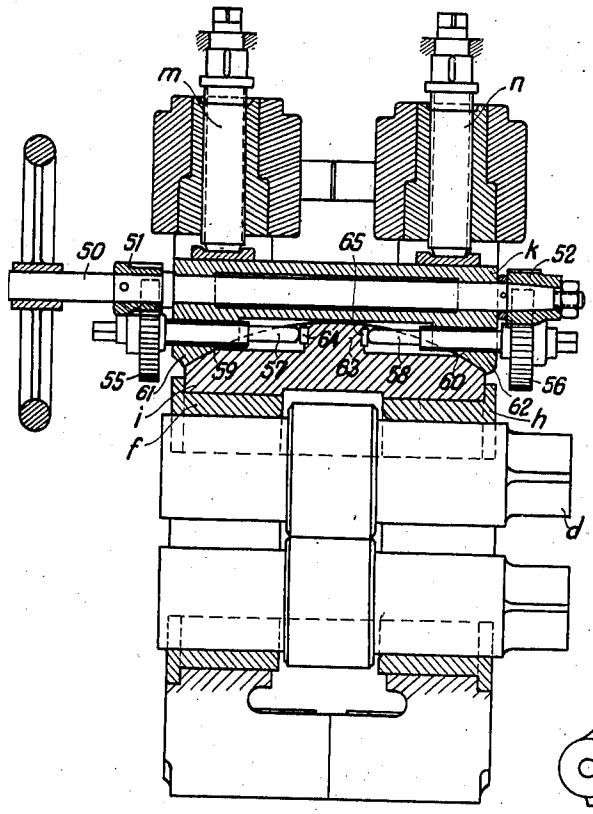
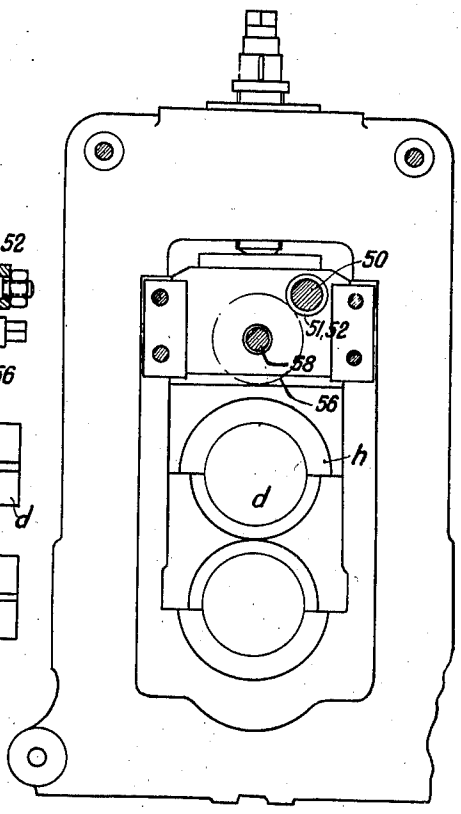


Fig.2.



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June 23, 1931. R. KRONENBERG 1,811,586

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Filed Aug. 28, 1929 3 Sheets-Sheet 2

Fig. 3.

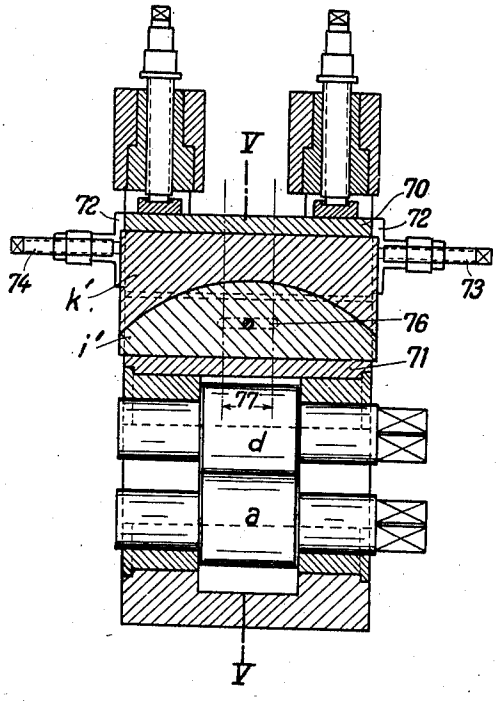


Fig. 4.

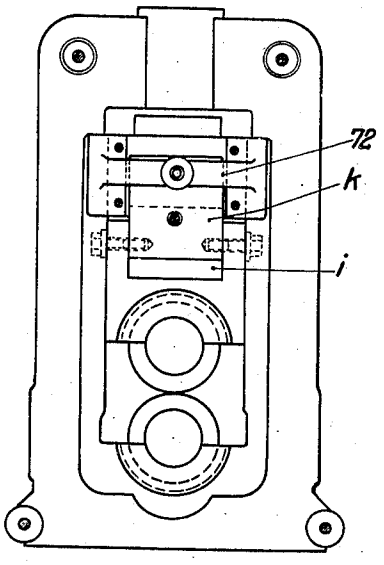
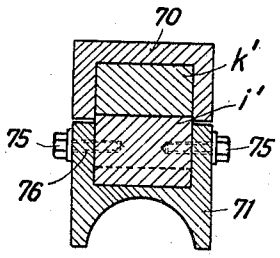


Fig. 5.



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Filed Aug. 28, 1929 3 Sheets-Sheet 3

Fig. 6.

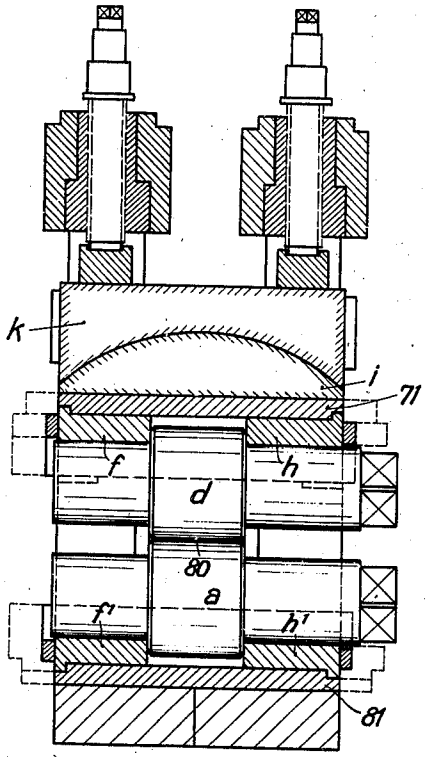
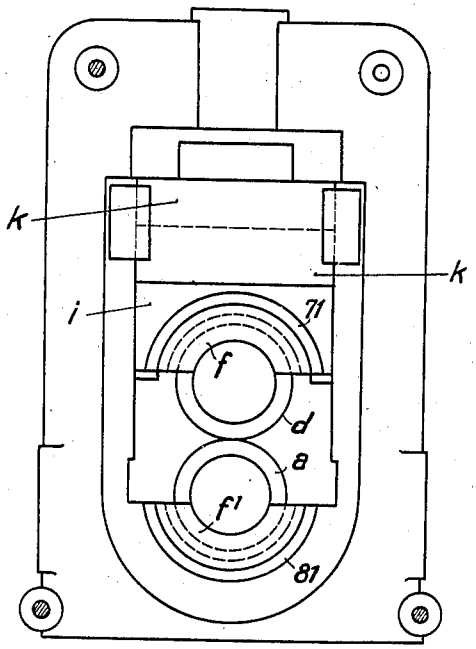


Fig. 7.



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UNITED STATES PATENT OFFICE

RUDOLF KRONENBERG, OF HAUS KRONENBERG, GERMANY

ROLLING MILL

Application filed August 28, 1929, Serial No. 389,007, and in Germany January 29, 1929.

This invention relates to certain new and useful improvements in rolling mills of that general type shown in my Patent No. 1,697,012, and resides in an improved construction and arrangements of parts, as will be more fully hereinafter described.

The invention is illustrated diagrammatically and by way of example on the accompanying drawings, on which Figure 1 is a vertical axial section through a rolling mill designed according to this invention, and Figure 2 is a side view of this rolling mill. Figure 3 is a view similar to Fig. 1, but drawn to a reduced scale with respect thereto, and shows a constructional form of the mill in which the centre of oscillation for the support of one of the rollers can be shifted for the purpose of utilizing the centre axial length of the operating portions of the rollers. Figure 4 is a side-view of this constructional form, and Figure 5 a section through the upper half of Fig. 3 in the line V—V thereof. Figure 6 is also a view similar to Fig. 1 showing another modication concerning the shifting of the centre of oscillation, and Figure 7 is a side-view of the modification.

It is, in the constructional form shown in Figures 1 and 2, assumed that the roller *d* is to be re-adjusted by means of the supporting body *i* for the two bearings *f* and *h*. The supporting body *i* contacts with the body *k* which in turn can be re-adjusted in known manner by the pressure spindles *m* and *n*. In the body *k* is supported a shaft 50 which can be turned by means of a hand-wheel or the like. To this shaft are affixed cog-wheels 51 and 52, of which one (preferably the wheel 52) is easily detachable. The two wheels 51 and 55 on the one side and 52 and 56 on the other side being different in such a measure that the suitable ratio of speed is attained. The wheel 55 is firmly affixed to the pressure bolt 57, and the cog-wheel 56 is also firmly secured to the pressure-bolt 58. Both bolts have screw-threads 59 and 60 at their supporting places, and the corresponding places in the members 61 and 62 in which said bolts are located are correspondingly threaded. When the shaft 50 is turned in the one or the other direction, the bolts 57 and 58 are turned correspondingly and simultaneously therewith moved axially, which is true, however, also of the member 63 of the supporting member *i*. It is suited to the purpose to insert pressure-transmitting members 64 and 65 between said member 63 and the said bolts.

When the first adjustment is to be made, first the spur-wheel 52 is removed from the shaft 50, and now the pressure bolt 58 is firmly pressed against the member 63 which in turn is thereby firmly pressed against the bolt 57. Then the wheel 52 is again affixed to the shaft 50 in such a position that a certain tension exists between its teeth and those of the cog-wheel 56. In this way a certain preliminary tension between the bolts 57 and 58 is attained, in that the several individual cog-wheels are all firmly connected with their appertaining shafts, and by that preliminary tension any end play or lost motion is completely obviated.

Concerning now the construction shown in Figures 3–5, the bodies or members *i'* and *k'* are practically such as in Figure 1, the member *k'* being also in this case concave on its bottom face and the member *i'* being convex on its top face. The two members are located between guide members 70 and 71, of which 71 can follow the oscillatory movement of the member *i'*, but which both (70 and 71) cannot (counter to the arrangement in Figures 1 and 2) be shifted in the axial direction of the rollers *d* and *a*. The cross-sectional shape of the said guide members 70 and 71 appears distinctly from Figure 5. The guide member 70 resembles in transverse section an inverted U and embraces or encloses the concave body member *k'*, whereas the guide member 71, more precisely, its upper portion, resembles in transverse section a U and embraces or encloses the convex body member *i'*. At each frontal side of the guide member 70 are horizontal bridges 72, of which each supports a pressure spindle 73, and 74 respectively, by which both body members *i'* and *k'* can be shifted in and between said guide members 70 and 71, both members *i'* and *k'* being

shifted at a time. The members *i* and 71 are connected with one another by screws 75 or the like threaded into the members *i*.

If the bodies *i'* and *k'* are to be shifted so as to shift at the same time their centres of oscillation, the screws 75 are unscrewed so as to disconnect the body *i'* from the guide member 71, and now both sides *i'* and *k'* together can be shifted by means of the screws 73 and 74. The threaded holes provided in the body *i'* for the reception of the screws 75 are at those faces where they terminate so extended horizontally in opposite directions as to form slots 76 (Fig. 3) in which the ends of said bolts can be shifted and which determine the maximum length of the shifting of the said body *i'*. The slots 76 are formed in the part 71. This maximum length is indicated in Fig. 3 by the dotted line 77. Within the length of this line any desired point can be chosen as centre of oscillation, so that also if narrow rolling material is to be dealt with the operative circumferential surface of the rollers can be fully utilized. The part *i* is oscillated as shown in my prior patent, above referred to.

In the third constructional form shown in Figs. 6 and 7, the members *i'* and *k'* are practically the same as in Figure 3. The concave member *k'* is stationary and the convex member *i'* can be turned in it so as to vary the pressure which the rollers exert upon the material to be rolled. The mechanism for thus turning said body *i'* may be of any desired design, for instance such as has already been described with respect to the other figures.

When the body *i'* is moved relatively to the body *k* the oscillatory axis 80 maintains always its position, viz, in the middle plane of the mill. But the two rollers *a* and *d*, together with their braces *f* and *h*, as well f^1 and h^1, and the supporting bodies 71 and 81, can be shifted laterally and parallel to the axis of the rollers, whereas the bodies *i'* and *k'* do not take part in that shifting. If the rollers together with the supporting parts are moved in one or the other of the possible two directions another point in the oscillatory axis 80 forms the centre of oscillation. The operating circumferential surfaces of the rollers can, thus, be used and utilized at any desired portion where the material to be rolled may be passed through.

The extreme positions of the parts *f*, *h*, 71 and 81 are indicated by dotted lines in Fig. 6.

No claim is made herein to the construction shown in Figures 3, 4, 5, 6 and 7.

What I claim is:

1. A rolling mill, comprising rollers, in combination with one of the rollers, an adjusting member provided for it and located above, and being coupled with it, a projection extending forth from the middle portion of said member; threaded bolts engaging said projection parallel to the axis of said roller on the two sides concerned, correspondingly threaded stationary members in which said bolts are supported; cog-wheels on the free ends of the bolts; other cog-wheels meshing with those first mentioned; a shaft to which said other cog-wheels are secured, and means for turning said shaft.

2. A rolling mill, comprising rollers, in combination with one of the rollers, an adjusting member provided for it and located above, and being coupled with it, a projection extending forth from the middle portion of said member; threaded bolts engaging said projection on opposite sides thereof; the axes of said bolts being parallel to the axis of said roller, correspondingly threaded stationary members in which said bolts are supported; cog-wheels on the free ends of the bolts; other cog-wheels meshing with those first mentioned; a shaft to which said other cog-wheels are secured, one of these other wheels being firmly affixed to the shaft, the other being detachable therefrom and located near an end of the same; and means for turning the said shaft, these means being located at that end of the same where the firmly fixed cog-wheel is situated, substantially as set forth.

3. A rolling mill, comprising, in combination with one of the rollers and with an adjusting member provided for it and located above, and being coupled with it, a projection extending forth from the middle portion of said member; a member arranged above said adjusting member; a shaft traversing said last mentioned member parallel to the axis of said roller; means for turning said shaft; means for engaging said projection parallel to the axis of said roller on the two sides concerned and motion-transmitting means inserted between said latter means and the said shaft, for the purpose set forth.

4. A rolling mill, comprising, in combination with one of the rollers and with an adjusting member provided for it and located above, and being coupled with it, a projection extending forth from the middle portion of said member; a member arranged above said adjusting member; a shaft traversing said last mentioned member parallel to the axis of said roller; threaded bolts engaging said projection parallel to the axis of said roller on the two sides concerned, correspondingly threaded stationary members in which said bolts are supported, and motion-transmitting means inserted between said bolts and the said shaft, for the purpose set forth.

5. A rolling mill, comprising, in combination with one of the rollers and with an

adjusting member provided for it and located above, and being coupled with it, a projection extending forth from the middle portion of said member; a member arranged above said adjusting member; a shaft traversing said last mentioned member parallel to the axis of said roller; threaded bolts to engage said projection supported; cog-wheels on the free ends of the bolts; other cog-wheels meshing with those first mentioned and being affixed to said shaft, one of said other wheels being firmly affixed to the shaft, the other being detachable therefrom, substantially and for the purpose, as set forth.

In testimony whereof I affix my signature.

RUDOLF KRONENBERG.