M. KOCH.

ROLLING MILL FOR ROLLING TUBES.

APPLICATION FILED JUNE 22, 1911.

1,067,990.

Patented July 22, 1913.

2 SHEETS—SHEET 1.

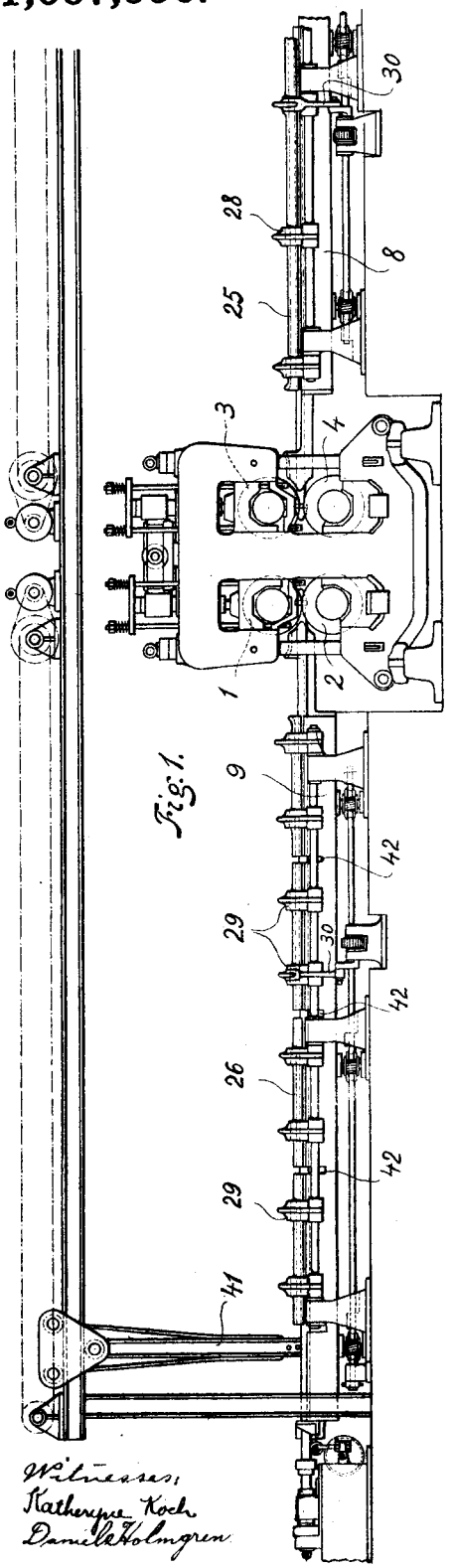


Fig. 1.

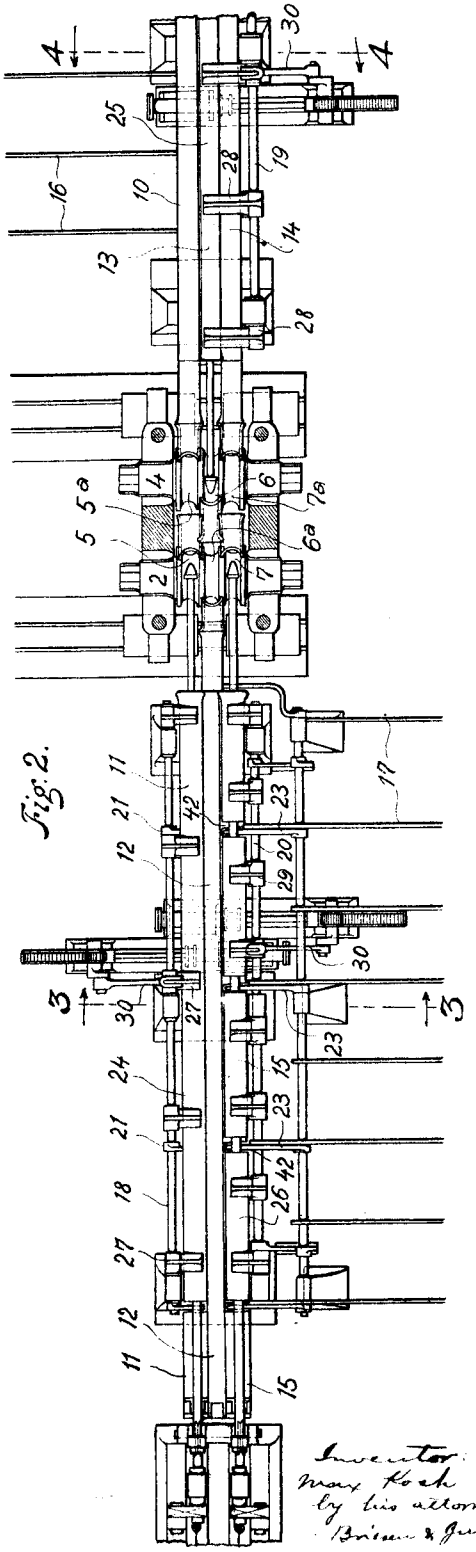


Fig. 2.

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Daniel Holmgren

Inventor:
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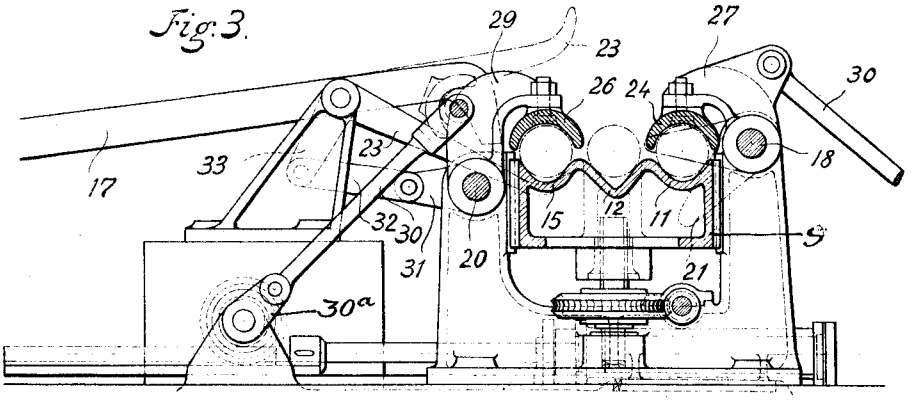
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Fig. 3.



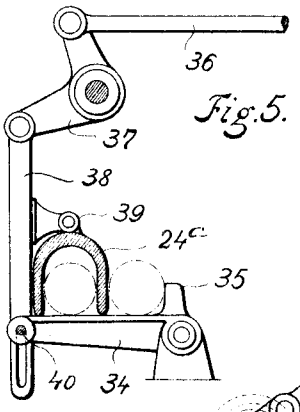


Fig. 5.

Fig. 4.

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UNITED STATES PATENT OFFICE.

MAX KOCH, OF RATINGEN, GERMANY.

ROLLING-MILL FOR ROLLING TUBES.

1,067,990. Specification of Letters Patent. Patented July 22, 1913.

Application filed June 22, 1911. Serial No. 634,726.

To all whom it may concern:

Be it known that I, MAX KOCH, a citizen of the Empire of Germany, residing at Ratingen, in the Empire of Germany, have invented certain new and useful Improvements in Rolling-Mills for Rolling Tubes, of which the following is a specification.

The present invention relates to a rolling mill for rolling tubes.

The rolling mill works with two pairs of rolls arranged side by side, the rolls continuously revolving in such a manner that the pair of rolls on the left will roll the piece to the left and the pair of rolls on the right will roll the piece to the right. The rolls of both pairs may be arranged in such a manner that they can be adjusted toward or away from each other in known manner and alternately, so that either one or the other pair of rolls will be in operative position.

The rolls are provided with several grooves and correspondingly several mandrels are alternately arranged on both sides of the rolling mill, so that a mandrel on the right corresponds to a free groove on the left and vice versa. The rods of the mandrels are adjustable in such a manner that they can be withdrawn from the work piece.

The rolling mill comprises means for moving the work from one groove to the other and embodies a novel arrangement of the grooves in the rolls.

In the accompanying drawings: Figure 1 is a side elevation of my improved rolling mill; Fig. 2 a plan thereof; Fig. 3 a cross section through table 9 and adjoining parts, on line 3, 3 Fig. 2; Fig. 4 a similar section through table 8 and adjoining parts on line 4, 4 Fig. 2, and Fig. 5 a cross section through a preferred form of the table.

In the constructional form exemplified in the accompanying drawing the one pair of rolls 1, 2 is provided with two grooves 5, 7 and the other pair of rolls 3, 4 with one groove 6. The vertically adjustable tables 8 and 9 are provided in the constructional form according to Figs. 1–4 on both sides of the rolling mill with grooves 10, 13, 14 and 11, 12, 15 respectively corresponding with the grooves in the rolls. The work piece reaches the groove 10 from the inclined way 16. It is then passed in this groove to the first groove 5 of rolls 1, 2. It then passes on the other side into the groove 11. After the mandrel has been withdrawn by mechanical means the work piece is moved into the neighboring groove 12, in which it is advanced so that it enters the second groove 6 in the second pair of rolls 3, 4. It then emerges into groove 13, is thence conveyed into groove 14 and groove 7, whereupon it passes into groove 15 whence it is lifted to the incline 17, from which it will roll down. Above the grooves into which the piece will emerge on leaving the rolls, are provided vertically adjustable guides 24, 25 and 26 which will prevent the work piece from warping or jumping the groove. Beneath the grooves, levers or transporters 21, 22 and 23 coupled to shafts 18, 19 and 20 are arranged. For permitting these levers to rise above the bottom of the grooves, transverse slots 42 are provided in the latter, through which the levers can pass. The guides and levers are operated by the same driving gear. When the work piece has left a roll and has entered one of the grooves beneath the lowered guide, the mandrel rod is first withdrawn and the guide is raised, after which the levers which enter into this respective groove are so operated by the shaft to which said guide is coupled, that they will convey the work piece from the groove into the neighboring groove. The guides are fitted to levers 27, 28 and 29 which are actuated by connecting rods 30 coupled to cranks 30^a. The levers 27 are fitted directly on the shaft 18 of levers 21. When therefore the guide is raised by means of lever 27, the levers 21 which will be in a lowered position at some distance from the guide, will also be raised and on the guide being sufficiently raised, they will enter the groove through slots 42, lift the piece and cause it to roll into groove 12. In a similar manner the levers 22 and 23 will be operated after the guide is raised: here however, the guide levers 28 and 29 are not fitted to the shaft of the levers 22 and 23, but are coupled thereto by means of levers 31, rods 32 and arms 33. The comparatively long levers 23 have hook-shaped front ends. The levers lift the piece to such a height that it will pass over them to the discharging incline 17. The cranks 30^a which are operated by a hydraulic plunger or the like, or by means of rack and pinion always complete a full revolution, so that after the tube has been ejected from the grooves the

guides and ejector levers will automatically return to their initial position.

The guide arrangement shown in Fig. 5 for the rolled work pieces differs somewhat from the one hereinbefore described. In this arrangement, the grooves are omitted in the feed platform. The work pieces are however, guided from one grooved roll to the other by means of levers 34 having stops 35, which serve as substitutes for the grooves, the levers 34 constituting guides for the work pieces. If the levers are raised on one side, the pieces will roll up to the stops 35. Preferably also the guides 24 receiving the tubes and the mandrel bars are raised by similar means previous to the raising of the levers. In the constructional form shown, the movement is transmitted from the driving means by aid of rods 36, levers 37 and rods 38 to the levers 34 and the guides 24^a. With the latter are coupled the rods 38 by means of bolts 39, while they are coupled to levers 34 by means of bolts 40. The latter engage slotted holes of rods 38 and are therefore not immediately lifted on the rod 38 being raised, the levers 34 being operated only after the guide has been raised. The levers 34 will finally assume such a slanting position, that the tube, out of which the mandrel bar has been withdrawn, will roll off, until it meets the stops 35. This stop will correspond with the next grooved roll, so that the rolling process may be continued. The tube is introduced between the rolls by means of sliding arms 41 operated through chains or the like. Such introduction of the tubes may, however, also be effected by air, steam or hydraulic pressure or the like.

Another feature of the new rolling mill consists in providing the rolls of both sets with grooves, whereby the grooves of but one set of rolls are employed for rolling the work piece, while the latter passes idly through the grooves of the other set. Grooves 5, 6, 7 and 5^a, 6^a, 7^a coöperate alternately with mandrels, so that only grooves 5, 6, 7 or grooves 5^a, 6^a, 7^a are used. With the arrangement of the mandrels shown in the drawing, the grooves 5, 6, 7 serve for rolling the work piece, while the latter idly passes through grooves 5^a, 6^a, 7^a. Therefore the pair of rolls which is temporarily inoperative need only be slightly raised so as to let the work piece pass through. When the grooves 5, 6, 7 have been worn out, the mandrels are changed to the grooves hitherto not used for rolling, so that these grooves will now roll the work piece. In consequence thereof the rolls can be used twice as long as otherwise with such rolling mills. Instead of exchanging the mandrels, the rolls may be interchanged, while the mandrels remain in position.

I claim:

1. In a rolling mill, two sets of coöperating rolls, each roll having a plurality of grooves, tables arranged on opposite sides of the rolls and adapted to alternately support the work piece, vertically reciprocable guides above the tables and adapted to receive the work piece, and means for laterally moving the work piece on the tables, so as to bring said work piece from alinement with one roll-groove into alinement with another groove.

2. In a rolling mill, two sets of coöperating rolls, each roll having a plurality of grooves, tables arranged on opposite sides of the rolls and adapted to alternately support the work piece, vertically reciprocable guides above the tables and adapted to receive the work piece, transporters for laterally moving the work piece on the tables, and means for consecutively raising said guides and transporters.

3. In a rolling mill, two sets of coöperating rolls, each roll having a plurality of grooves, tables arranged on opposite sides of the rolls and adapted to alternately support the work piece, vertically reciprocable guides above the tables and adapted to receive the work piece, transporters for laterally moving the work piece on the tables, stops for said work piece, and means for consecutively raising said guides and transporters.

4. In a rolling mill, two sets of coöperating rolls, each roll having a plurality of grooves, grooved tables arranged on opposite sides of the rolls, the table grooves being alined with the roll grooves, and transporters adapted to convey the work piece from one table groove into an adjoining table groove.

5. In a rolling mill, two sets of coöperating rolls, each roll having a plurality of grooves, tables arranged on opposite sides of the rolls and adapted to receive the work piece, transporters adapted to laterally move the work piece, and means for limiting said lateral movement of the work piece.

6. In a rolling mill, two sets of coöperating rolls, each roll having a plurality of grooves, tables arranged on opposite sides of the rolls and adapted to receive the work piece, levers adapted to laterally move the work piece, and means on said levers for limiting said lateral movement of the work piece.

In testimony whereof I hereto affix my signature in presence of two witnesses.

MAX KOCH. [L. S.]

Witnesses:
ALBERT F. NUFER,
ALFRED HENKEL.