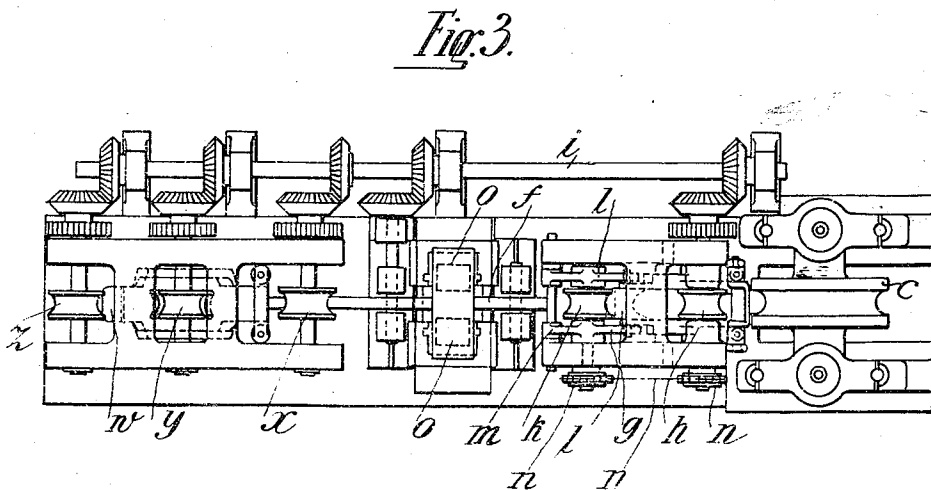
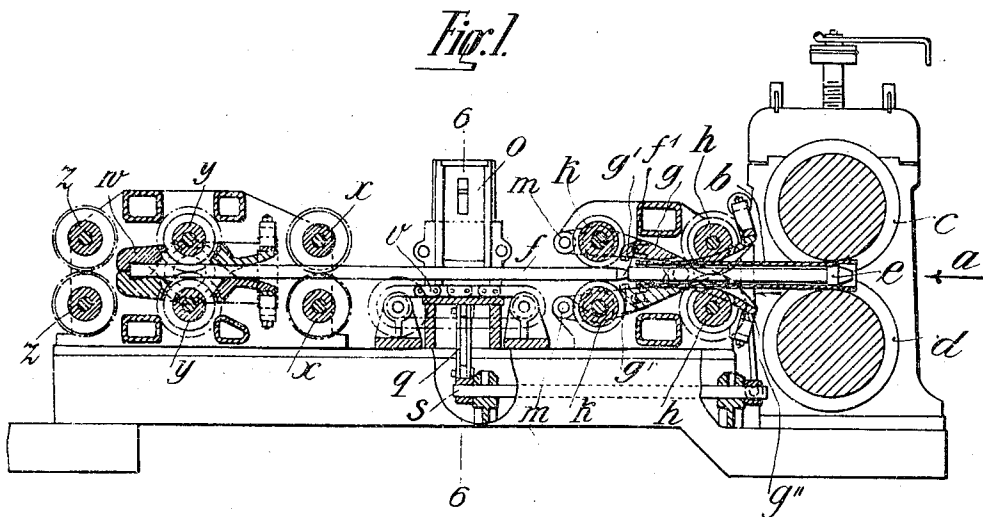


H. STÜTING.
TUBE ROLLING MILL.
APPLICATION FILED FEB. 13, 1909.

961,818.

Patented June 21, 1910.

4 SHEETS—SHEET 1.



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Fig. 2.

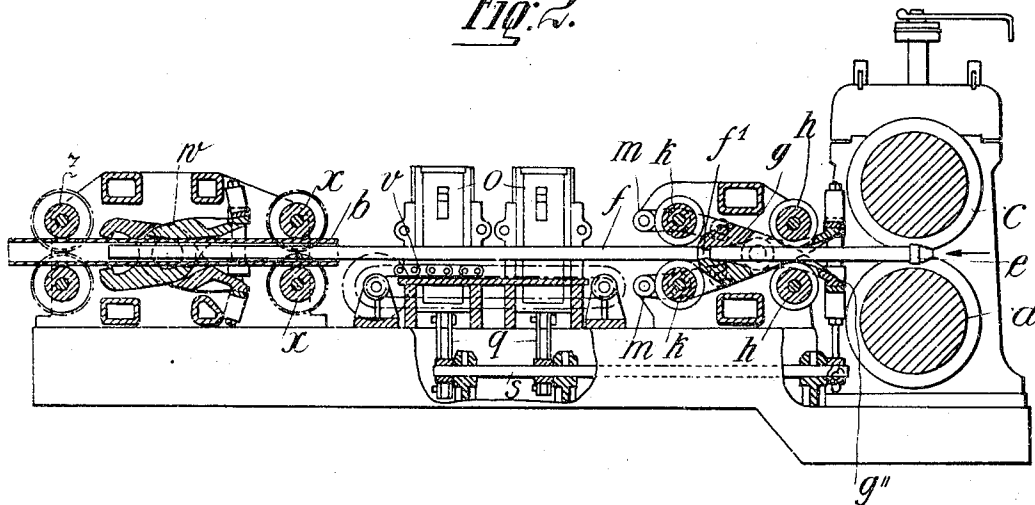
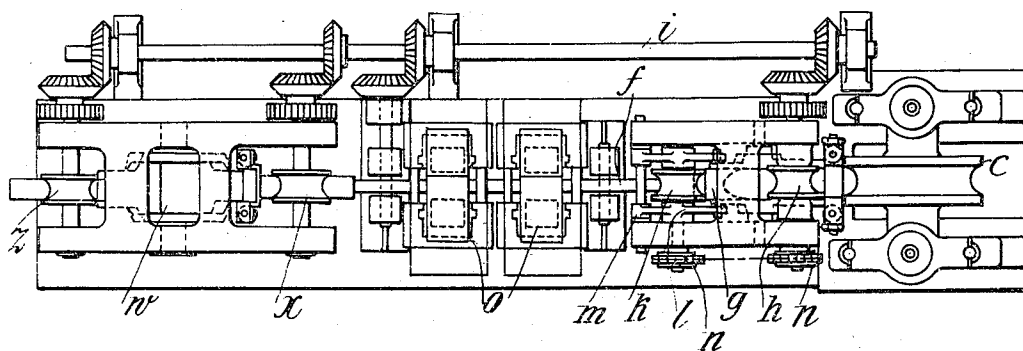


Fig. 4.



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4 SHEETS—SHEET 3.

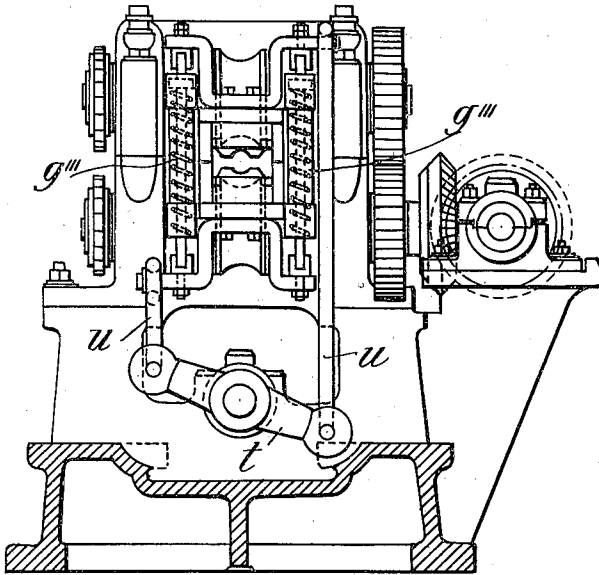


Fig. 5.

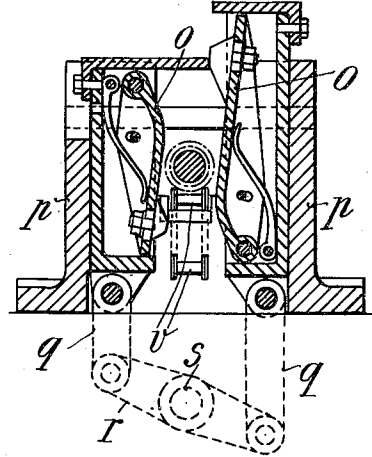


Fig. 6.

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4 SHEETS—SHEET 4.

Fig. 7.

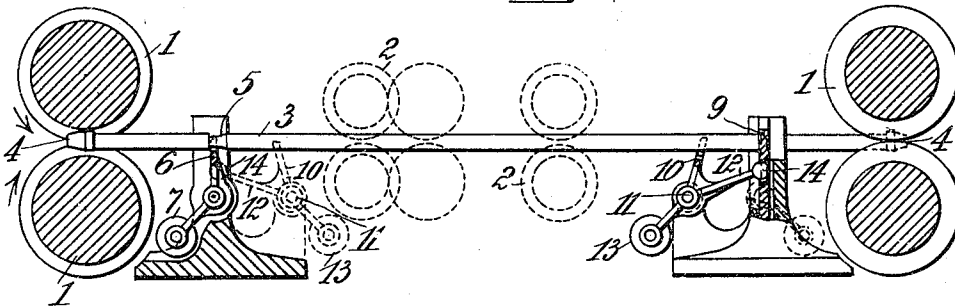
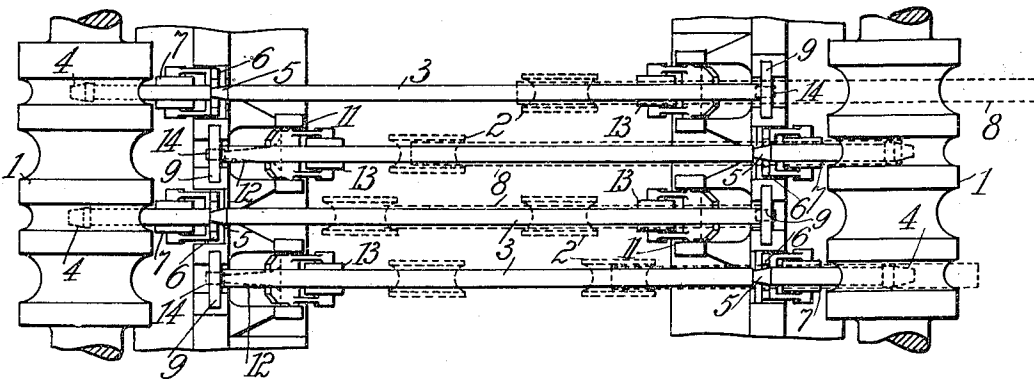


Fig. 8.



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UNITED STATES PATENT OFFICE.

HEINRICH STÜTING, OF WITTEN, GERMANY.

TUBE-ROLLING MILL.

961,818.

Specification of Letters Patent. Patented June 21, 1910.

Application filed February 13, 1909. Serial No. 477,513.

To all whom it may concern:

Be it known that I, HEINRICH STÜTING, a subject of the German Emperor, and residing at 26 Breddestrasse, Witten a/d Ruhr, Germany, have invented certain new and useful Improvements in Tube-Rolling Mills, of which the following is a specification.

This invention relates to improvements in rolling mills for the manufacture of seamless tubes, of the kind comprising a plurality of independent rolling mills arranged behind one another in which the mandrel of each mill has abutments at each end.

The improvements consist in arranging the two abutments of each mandrel behind the reducing rolls of its respective rolling mill and in providing means whereby the said abutments are thrown out of operation automatically by the tube as it passes from one abutment to the next. Any desired number of sets of rolls may be employed arranged behind one another.

In the accompanying drawings:—Figure 1 is a side elevation partly in vertical longitudinal section of one rolling mill embodying the present improvements, the parts being shown in one position of operation. Fig. 2 is a similar view of a succeeding set with the parts shown in another position of operation. Fig. 3 is a plan to Fig. 1. Fig. 4 is a plan to Fig. 2. Fig. 5 is a view of the front abutment looking in the direction indicated by the arrow *a* in Fig. 1. Fig. 6 is a section on the line 6—6 of Fig. 1, showing the turning mechanism. Fig. 7 is a diagrammatic side elevation partly in section of the improved rolling mill comprising two pairs of rolls each pair having two passes. Fig. 8 is a plan to Fig. 7.

Referring to Figs. 1 and 3, *b* indicates a seamless tube being rolled. *c* and *d* are the rolls of the first set in the series. *e* is the plug supported by the mandrel, *f*. *g* are tongs having front jaws, *g'*. *h* are driving rolls driven from the shaft, *i*. *k* are rocking driving rolls mounted in rocking levers, *l* pivoted at *m*, in the front ends of the tongs, *g*. The rocking rolls, *k*, are driven by means of pitch chains and chain wheels, *n*.

In the operation of the apparatus the tube, *b*, being rolled is passed first over the plug, *e*, between the rolls, *c* *d*, of the first set, the jaws, *g'*, of the tongs, *g*, being normally engaged in the contracted neck portion, *f'*, of the mandrel, *f*. On leaving these

rolls the front end of the tube, *b*, strikes the tongs, *g*, and forces the jaws, *g'*, out of engagement with the mandrel, *f*. The tube, *b*, in passing through the open jaws, *g'*, is gripped by the rear driving rolls, *h*, and carried toward the front driving rolls, *k*. These rollers, *k*, rock with the tongs, *g*, in such a manner that the said tongs cannot close upon the tube, *b*, until the said tube has passed completely through the rolls, *k*. The result of this is that the jaws of the tongs *g*, constituting the front abutment will release the tube entirely and will then close again. The tube, *b*, has now reached the turning device by means of which the tube is to be turned through 90 degrees for the purpose of preventing the formation of fins which might occur if the tube were passed always in the same position through the succeeding sets of rolls. This turning device (Fig. 6) comprises two approximately vertical flat plates, *o*, mounted in casings, *p*, so as to be capable of up and down movement therein. These plates are connected by links, *q*, to a lever, *r*, fixed on a rocking shaft, *s*, which is actuated by means of a lever, *t* (Fig. 5). The ends of this lever are connected by means of two rods, *u*, to the rear ends, *g''*, of the tongs, *g*. A conveyer chain, *v*, (Fig. 1) is located between the two plates, *o*, of the turning device, and serves to feed the tube, *b*, along when the said tube, *b*, has been turned.

The operation of the turning device is as follows:—When the tongs, *g*, are opened by the entry of the tube, *b*, thereinto, the rocking shaft, *s*, is rotated thereby through the medium of the rods, *u*, and the lever *t*, in such a manner as to cause the plates, *o*, of the turning device to move respectively up and down. When the tube, *b*, has advanced beyond the tongs, *g* and the rolls, *k*, and has reached the turning device the said tongs are closed by the action of the springs, *g'''*. At the same time the plates, *o*, move again in opposite directions in the same manner as in the opening movement of the tongs, and thereby turn the tube between them on its own axis through 90 degrees. The upper end of one plate and the lower end of the other plate is bent outwardly so that when the two plates approach their highest and lowest positions, they will release the tube at the end of the turning movement. After the tube, *b*, has been turned by the plates *o*, and

released by them as described, the said tube is conveyed by the chain, *v*, toward the driving rolls, *x*, which grip the tube and feed it into the next tongs, *w*. In its advance the front end of the tube strikes and opens the tongs, *w*, and is then conveyed by the driving rolls, *y* and *z*, completely out of the first rolling mill.

The sequence of operations is repeated in the second and following mills or rolling apparatus.

All the driving rolls and conveyer chains are driven from the line of shafting, *i*, which may be driven from its own mill, or by a separate motor.

In the rolling mill shown in Figs. 7 and 8 the devices for effecting the automatic disengagement of the abutments are arranged to operate in alternately opposite directions.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In a rolling mill of the kind described the combination of a plurality of sets of rolls for rolling seamless tubes, a mandrel section coöperating with each said set of rolls, two abutments for each said mandrel section, located behind each other and behind the respective set of rolls, and means operated by the tube being rolled whereby the tube in its advance throws each abutment successively out of operation, as set forth.

2. In a rolling mill of the kind described the combination of a plurality of sets of rolls for rolling seamless tubes, a mandrel section coöperating with each said set of rolls, two pairs tongs constituting two abutments located behind each other and behind the respective set of rolls, and means whereby each pair of tongs is opened by the tube in its advance through the rolling mill, as set forth.

3. In a rolling mill of the kind described, the combination of a plurality of sets of rolls for rolling seamless tubes, a mandrel section coöperating with each said set of rolls, two abutments for each said mandrel section, located behind each other and behind the respective set of rolls, means operated by the tube being rolled whereby the tube in its advance throws each abutment successively out of operation, and means for rotating the tube on its axis operated by each of said abutments as it is thrown out of operation by the advance of the tube, as set forth.

4. In a rolling mill of the kind described, the combination of a plurality of sets of rolls for rolling seamless tubes, a mandrel section coöperating with each said set of rolls two pairs of tongs constituting two abutments located behind each other and behind the respective sets of rolls, means whereby each pair of tongs is opened by the tube in its advance through the rolling mill, and means for rotating the tube on its axis operated by

each of said pairs of tongs as it is opened by the advance of the tube, as set forth.

5. In a rolling mill of the kind described, the combination of a plurality of sets of rolls for rolling seamless tubes, a mandrel section coöperating with each said set of rolls, two pairs of tongs constituting two abutments located behind each other and behind the respective set of rolls, means whereby each pair of tongs is opened by the tube, in its advance through the rolling mill, two plates vertically movable simultaneously in opposite directions, adapted to grip the rolled tube between them and means for operating said plates from the preceding pair of tongs, whereby the said tube is turned partly rotated on its axis on leaving the said tongs, for the purpose of preventing the formation of a fin on the rolled tube as set forth.

6. In a rolling mill of the kind described the combination of a plurality of sets of rolls for rolling seamless tubes, a mandrel section coöperating with each said set of rolls, two pairs of tongs constituting two abutments located behind each other and behind the respective set of rolls, means whereby each pair of tongs is opened by the tube in its advance through the rolling mill, two plates vertically movable simultaneously in opposite directions, adapted to grip the rolled tube between them and means for operating said plates from the preceding pair of tongs, whereby the said tube is rotated on its axis on leaving the said tongs, for the purpose of preventing the formation of a fin on the rolled tube and a chain conveyer between the said plates for conveying the tube after rotation to the next pair of tongs, as set forth.

7. In a rolling mill of the kind described the combination of a plurality of sets of rolls for rolling seamless tubes, a mandrel section coöperating with each said set of rolls, two pairs of tongs constituting two abutments located behind each other and behind the respective set of rolls, means whereby each pair of tongs is opened by the tube in its advance through the rolling mill, two plates vertically movable simultaneously in opposite directions, adapted to grip the rolled tube between them, a lever mounted on a rocking shaft, links connecting said plates to the respective ends of said lever, a lever on said rocking shaft and rods connecting the respective ends of the last mentioned lever, to the rear ends of the preceding pair of tongs, whereby the tube is rotated on its axis as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HEINRICH STÜTING. [L. s.]

Witnesses:

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W. W. BRUNSWICK.