M. PETERS.

ROLLING MILL FOR PRODUCING TUBES.

APPLICATION FILED APR. 29, 1909.

970,263.

Patented Sept. 13, 1910.

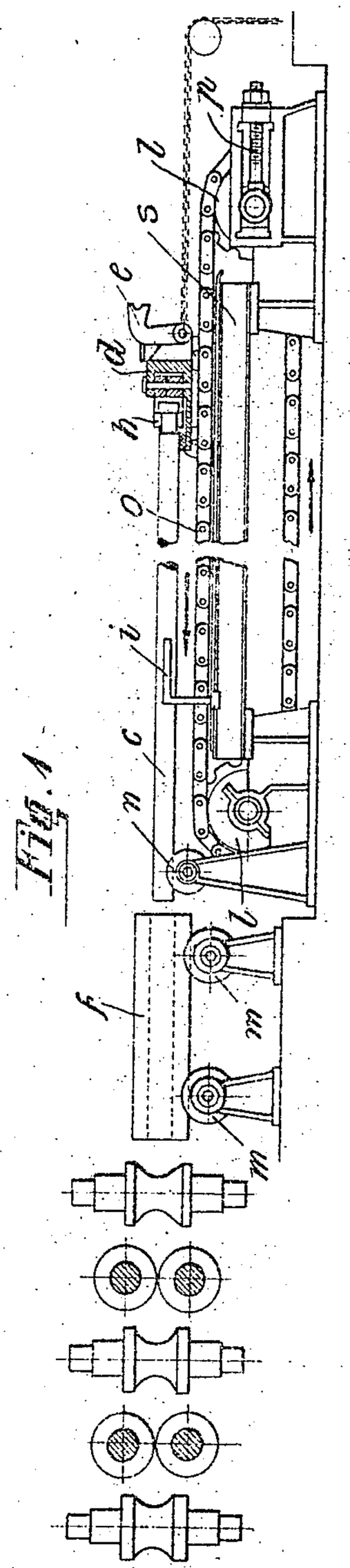

Fig. 1.

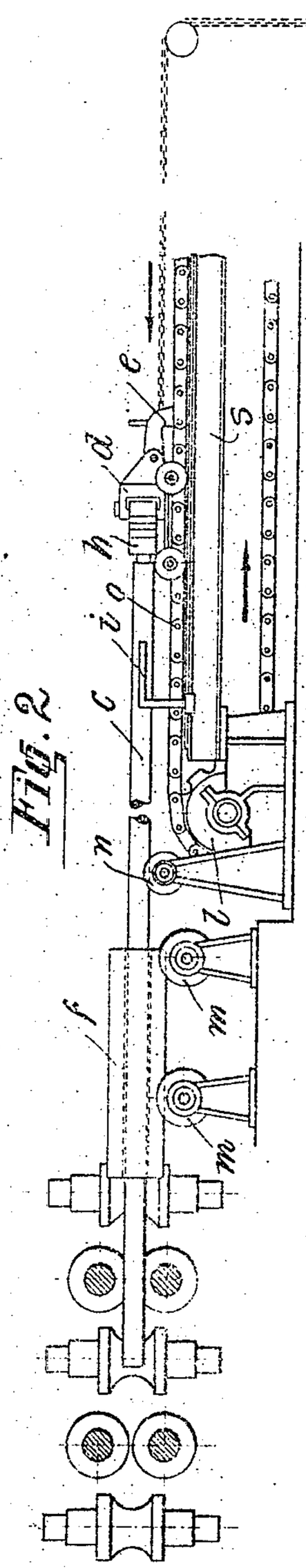

Fig. 2.

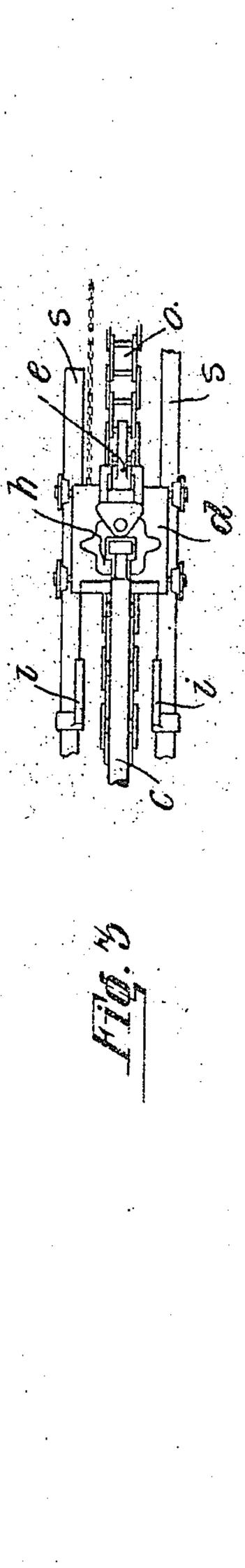

Fig. 3.

Witnesses:
Karl Ammann jr.
Carl Sonnet.

Inventor:
Mathias Peters.

UNITED STATES PATENT OFFICE.

MATHIAS PETERS, OF BENRATH, NEAR DUSSELDORF, GERMANY.

ROLLING-MILL FOR PRODUCING TUBES.

970,263. Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed April 29, 1909. Serial No. 492,859.

To all whom it may concern:

Be it known that I, MATHIAS PETERS, mechanical engineer, subject of the German Emperor, and residing at Benrath, near Dusseldorf, Germany, have invented a certain and useful Rolling-Mill for Producing Tubes, of which the following is a specification.

The invention relates to rolling mills for producing seamless tubes from a hollow ingot or blank and it has for its object to so regulate the forward motion of the mandrel employed in such mills that its speed shall not exceed the average speed of the rolls, whereby it becomes possible to roll tubes of great length by means of short mandrels, and to more readily extract the said mandrel from the finished tube.

In rolling mills serving for rolling tubes over a mandrel, the speed with which the work-piece moves forward, as well as the peripheral speed of the various pairs of rolls, with axes crossing one another, and arranged behind each other, varies very much during the rolling process. The speed of the work-piece while it passes through the last pair of rolls is as much greater than while passing through the first pair of rolls, as the inclosed profile of the rolls, after deducting the cross-section of the mandrel, is larger than the profile inclosed by the last pair of rolls. The speed of the work-piece therefore increases from one pair of rolls to the other. The speed, also, with which the work-piece, after having been rolled, leaves one pair of rolls is, as has been ascertained by recent trials, nearly exactly equal to the peripheral speed of the rolls of the corresponding pair of rolls.

If during the rolling process the mandrel is left entirely to itself, it moves forward, together with the work-piece, with a speed which is greater than the peripheral speed of the rolls of the first pair of rolls and less than that of the rolls of the last pair of rolls. The mandrel thus goes ahead of that part of the work-piece which is within the first pair of rolls, and remains behind that part of the work-piece which is within the last pair of rolls, thereby sliding, under great friction, along the pierced walls of the work-piece; the speed of the mandrel being the same as the speed of that part of the work-piece within the middle pair of rolls. It is evident that neither the power required for the working of the rolling-device will be increased, nor that the quality of the tube to be produced be influenced unfavorably if the mandrel itself is forced to move with the greatest speed of the work-piece or with the least speed of the work-piece; for the total amount of the friction to be overcome, between the mandrel and the pierced wall, will be nearly the same in both cases. The force with which the mandrel has to be pushed forward or be kept back for effecting such a motion, is therefore an insignificant one, as the trial shows and as must be evident from theoretical consideration. However, as the mandrel itself is forced to move itself with the least speed of the work-piece, or even a little slower, one attains the advantage of being able to roll tubes of great length by means of short mandrels and to extract the mandrels out of the finished tube—in which manipulation the mandrels often break off—much quicker and easier.

The nature of my invention will be best understood in connection with the accompanying drawing, in which—

Figure 1 is an elevation of the rolling mill, the pierced bloom being supported on rollers and the mandrel not yet inserted. Fig. 2 is a similar view showing the mandrel passing through the pierced bloom which is about to enter the rolls. Fig. 3 is a fragmentary plan view of Fig. 2.

Similar characters of references designate corresponding parts throughout the several views.

Referring now to the drawings, it will be noted that this new arrangement consists of a small truck running on rails, which is provided with a gap-clutch for carrying the end of the mandrel, and can be coupled to an endless link-chain, running over rollers, and moving at a speed corresponding preferably to the peripheral speed of the first pair of rolls and in the direction of the motion of the work-piece. In the position shown in Fig. 1, the mandrel *c* has been entirely drawn back and the work-piece *f*, a pierced bloom, has just been placed upon the rollers *m*. The outer end of the mandrel then rests in the gap-clutch *h* of the small truck *d* running on rails *s*, and the inner end on a roller *n*. To the small truck, seen in Fig. 3 from above, a lever *e* is attached, the end of which is so formed that during the descent of the lever it hooks itself firmly to a link of the

endless chain *o* running between rails *s*. The chain *o* runs over two rollers *l*, the distance between which can be regulated by means of a slack adjusting device *p*; and one of the rollers is driven from the same driving mechanism by which the first pair of rolls is rotated.

During the rolling process the lever *e* is first pushed down—see Fig. 2 and thus the truck *d* coupled to the continually progressing chain *o*. After the inner end of the mandrel has passed through the hole in the bloom *f* and after it has entered into the rolling-device to some extent (this distance being determined by consideration of the fact that the inner end of the slowly moving mandrel must not be overtaken by the continually faster moving front-part of the work-piece, before it reaches the last pair of rolls) the bloom *f* which has been held until that moment is allowed to also run along and to enter into the first pair of rolls, as is shown in Fig. 2.

The stops *i* which operate upon the gap-clutch *h* (Fig. 2) and which open the same, are adjusted in such a way, that, when the mandrel together with the work-piece has left the rolling-device, the inner end of the mandrel projecting out of the work-piece is only just so long that it can easily be gripped by the machine, in order to be extracted. Also the uncoupling of the truck shall preferably be done automatically by suitable stops. After having been uncoupled, the truck returns to its original position by means of a weight *k* or the like hooked to a rope running over rollers, to take up another mandrel.

The chain, of course, could also be driven with non-uniform, gradually increasing speed, and the truck might be replaced by a simple sliding-device.

I claim:—

1. In a rolling mill for forming seamless tubes from a hollow ingot or blank: a series of rolls having their passes in alinement; means to support said ingot previous to its entry between said rolls; a mandrel adapted to enter the ingot so supported, and to pass with the same into said series of rolls; movable means to support the outer end of said mandrel and to travel toward the said series of rolls; and driving means for said movable means to control the speed of the mandrel in the passes as the tube is being rolled.

2. In a rolling mill for forming seamless tubes from a hollow ingot or blank: a series of rolls having their passes in alinement; means to support said ingot previous to its entry between said rolls; a mandrel adapted to enter the ingot so supported, and to pass with the same into said series of rolls; a truck, and rails upon which said truck is movable, said truck being adapted to support the outer end of said mandrel and to travel upon the said rails toward said series of rolls; driving means for said truck to control the speed of the mandrel in the passes as the tube is being rolled; means to couple said mandrel to said truck; and means to couple said truck to said driving means.

3. In a rolling mill for forming seamless tubes from a hollow ingot or blank: a series of rolls having their passes in alinement; means to support said ingot previous to its entry between said rolls; a mandrel adapted to enter the ingot so supported, and to pass with the same into said series of rolls; a truck, and rails upon which said truck is movable, said truck being adapted to support the outer end of said mandrel and to travel upon the said rails toward said series of rolls; driving means for said truck to control the speed of the mandrel in the passes as the tube is being rolled; means to couple said mandrel to said truck; means to couple said truck to said driving means; and means to uncouple said mandrel from said truck when the latter arrives at a predetermined point of said rails.

4. In a rolling mill for forming seamless tubes from a hollow ingot or blank: a series of rolls having their passes in alinement; means to support said ingot previous to its entry between said rolls; a mandrel adapted to enter the ingot so supported, and to pass with the same into said series of rolls; a truck, and rails upon which said truck is movable, said truck being adapted to support the outer end of said mandrel and to travel upon the said rails toward said series of rolls; driving means for said truck to control the speed of the mandrel in the passes as the tube is being rolled; means to couple said mandrel to said truck; means to couple said truck to said driving means; means to uncouple said mandrel from said truck when the latter arrives at a predetermined point of said rails; and means to return said truck when the same is uncoupled.

5. In a rolling mill for forming seamless tubes from a hollow ingot or blank; a plurality of pairs of rolls, with axes crossing one another and having their passes in alinement; means to support said ingot previous to its entry between the said rolls; a mandrel adapted to enter the ingot so supported, and to pass with the same into said series of rolls; a truck, and rails upon which said truck is movable, said truck being adapted to support the outer end of said mandrel and to travel upon said rails toward said series of rolls; an endless chain between said rails, and means to drive the same at a speed not exceeding the average peripheral speed of the rolls, said chain being adapted to control the speed of the mandrel in the passes as the tube is being rolled; means to

couple said mandrel to said truck; means to couple said truck to said chain; means to uncouple said mandrel from said truck when the latter arrives at a predetermined point of said rails; means to uncouple said truck from said chain; and means to return said truck when the same is uncoupled.

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

MATHIAS PETERS. [L. S.]

Witnesses:

OTTO KÖNIG,

C. J. WRIGHT.