A. A. K. NOWAK.

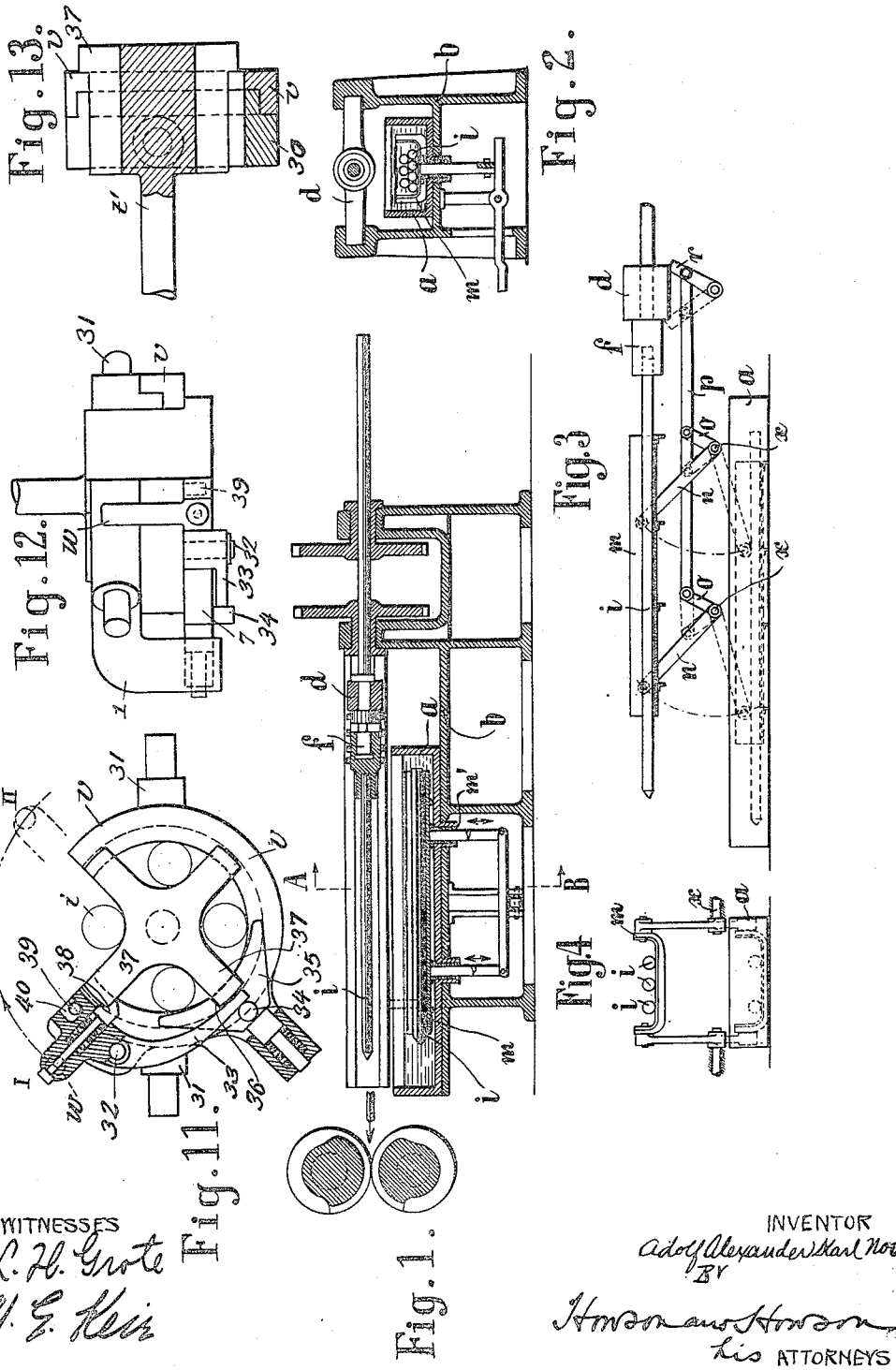
TUBE ROLLING MILL.

APPLICATION FILED FEB. 16, 1911.

1,036,309.

Patented Aug. 20, 1912.

2 SHEETS—SHEET 1.



WITNESSES

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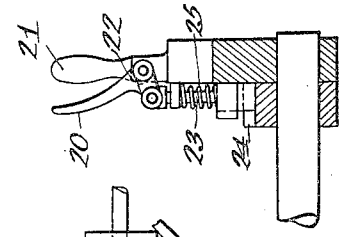

Fig. 10.

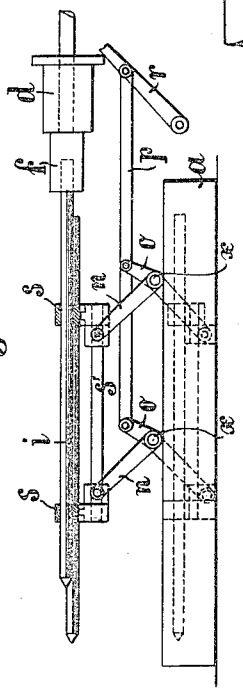

Fig. 5

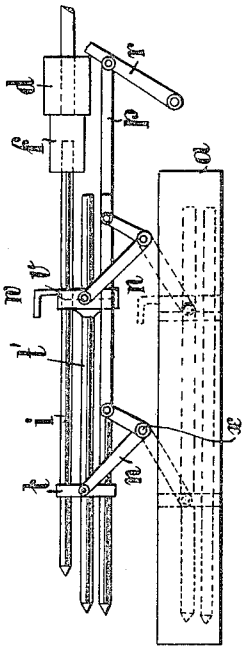

Fig. 7

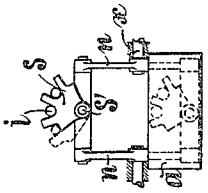

Fig. 6

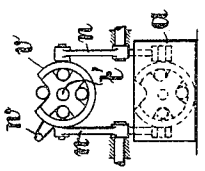

Fig. 8

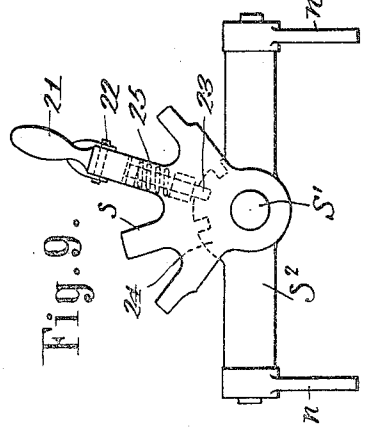

Fig. 9.

WITNESSES

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UNITED STATES PATENT OFFICE.

ADOLF ALEXANDER KARL NOWAK, OF BOUS-ON-THE-SAAR, GERMANY.

TUBE-ROLLING MILL.

1,036,309. Specification of Letters Patent. Patented Aug. 20, 1912.

Application filed February 16, 1911. Serial No. 609,071.

To all whom it may concern:

Be it known that I, ADOLF ALEXANDER KARL NOWAK, a subject of the Emperor of Austria-Hungary, and residing at Bous-on-the-Saar, Germany, have invented a certain new and useful Improvement in Tube-Rolling Mills, of which the following is a specification.

My invention relates to tube rolling mills and particularly to a device for handling the mandrel on which the tube is formed.

In the accompanying drawings, Figure 1 is a diagrammatic longitudinal section; Fig. 2 is a diagrammatic cross section of so much of a tube rolling mill as is necessary to illustrate the application of my invention thereto in one form; Figs. 3 and 4 are similar views of another embodiment of my invention; Figs. 5 and 6 are the same of another embodiment; and Figs. 7 and 8 are the same of a fourth embodiment. Figs. 9 and 10 are front and side views respectively of another form of mandrel carrier. Fig. 11 is a broken end elevation of a device for rotating a mandrel carrier of the type illustrated in Figs. 7 and 8; and Figs. 12 and 13 are respectively plan and broken vertical sections thereof.

In tube rolling mills in which the tube mandrel is drawn out of the tube by the retreat of the mandrel slide, considerable time is ordinarily lost in the substitution of a cooled mandrel for one in use which has become overheated during the progress of the work, since the cooled mandrel is now taken by hand from a cooling trough and laboriously positioned and secured to the slide-clamp. The present invention aims to simplify this labor and thereby to increase the efficiency of the mill, by providing a rising and falling carrier for the mandrels, which not only receives the hot mandrel from the slide but provides a cooled one ready for installation, which it has lifted from a cooling trough located under the mandrel slideway. By this means the substitution of the cooled for the heated mandrel is much expedited as well as the accompanying labor much reduced. Several ways of accomplishing this are illustrated. In the form shown in Figs. 1 and 2, the cooling trough *a* is supported on a cross web between the sides of the slide frame *b*, directly under the mandrel *i* and its slide *d* in their withdrawn position, so that the distance which the cooled mandrel has to be lifted to position is made as short as possible. The lifting of the cooled mandrel from and the deposit of the hot mandrel in the cooling trough (which heretofore has been accomplished by manual labor with accompanying effort and loss of time), is now performed by the mandrel carrier *m*. The latter is here shown as a concaved plate supported on rods m^1 passing through stuffing boxes in the bottom of the trough *a*, vertical motion may be imparted in any suitable way to the rods m^1, for example by a foot pedal mechanism. In the forms shown in the remaining figures, the mandrel carrier *m* is lifted and lowered through a connection with the mandrel slide. Thus in the form shown in Figs. 3 and 4 the carrier *m* is supported by two pairs of bell crank levers *n*—*o*, with bearings at *x*, and pivoted by the short arms *o* to the longitudinal bar *p* which, in turn, is pivoted to the arm *r*, the free end of which is arranged in the path of the mandrel slide *d*. Obviously when the slide, on its return travel, impinges against the arm *r*, the lever system just described is actuated and the carrier *m* lifted out of the trough *a* to position to receive the hot mandrel from the clamp *f*, while the cooled mandrel is in position to be adjusted in the clamp *f* with very little effort or loss of time. As soon as the tube blank has been adjusted on the fresh mandrel and the slide *d* moved forward to the rollers, the mandrel carrier *m* sinks simultaneously by gravity into the cooling trough *a*.

In Figs. 5 and 6 the carrier is modified to comprise a pair of segmental plates *s* fast with a shaft s^1 which has limited oscillation on cross bars s^2 pivoted to the links *n*. Notches are formed in the edges of this plate to receive the mandrels. In the form shown two notches are provided, but as many may be formed as is desired. It is readily understood that when the carrier has been lifted by the return motion of the slide *d*, and the hot mandrel freed from the clamp *f* and rested in a pair of empty notches in the carrier, all that is necessary to bring the cooled mandrel into position for adjustment in the clamp *f*, is to swing the carrier on its axis s^1 until the cooled mandrel occupies the position just filled by the heated mandrel released from the clamp, and its adjustment is then but a matter of a moment and practically no effort. This arrangement just described permits but a single mandrel to be kept in the cooling trough however and this is not enough when the mill is operated at

high speed, since sufficient time does not elapse before the fresh mandrel heats, to permit the one just removed, to cool. Consequently the arrangement shown in Figs. 7 and 8 is preferable for mills running at high speed. Here the segmental plates of Figs. 5–6 are transformed into cross-shaped carriers mounted at each end of the shaft t^1 and rotating in ring bearings v open at the top and carried between the pairs of links n. A handle w may be provided to rotate the carrier said handle being operatively connected thereto in any desired manner. In this form the heated mandrel is deposited in uppermost notches of the cross located at the opening in the top of the bearing and the handle w then actuated to bring a cooled mandrel to the opening in the bearing. As the carrier is thus rotated the mandrel in the lowermost notch is prevented by the bearing ring v from falling out of the carrier. Any suitable number of notches may be provided, four as illustrated, being sufficient for most mills.

If desired, the segmental plates s of Figs. 5 and 6 may be provided with three or more mandrel notches, as illustrated in Figs. 9 and 10. In this case, a stop device such as shown in the latter figures may be employed. As shown, the device comprises a toothed arc 24 fast with the cross bar s^2, on which the segmental plate s is pivoted. One of the arms of the latter is extended to form a handle 21 to which is jointed the finger lever 20 which controls the pin 23 normally pressed by the spring 25 into engagement with the teeth of the arc 24. Inasmuch as these teeth correspond with the arms of the arc 24, the plate S will be held by the pin 23 in the various positions necessary to bring the mandrels successively into position for use.

When a mandrel carrier of the cross type shown in Figs. 7 and 8 is employed, a device for rotating the same may be constructed as illustrated in Figs. 11 to 13. On the segmental bearing block 30 fast with the cross shaft 31, pivoted on the arms n, an oscillating segment ring v is mounted. This ring v carries an operating handle w which also serves as a detent freeing lever. For this purpose it is pivoted at 32 on the ring v and is provided with an arm 33, the free end of which engages beneath the pin 34 of the spring pressed detent 35. The latter is carried by the bearing block 30 and is radially displaceable but has no rotary motion. A recess 36 in its inner face is provided to receive the end of one of the arms 37 of the cross shaped mandrel carrier. In order to free the detent, the handle w is swung down upon its pivot 32 until the arm 33 has raised the detent 35 against the action of its spring until it is out of engagement with the arm 37 of the carrier. The latter is then free to be rotated, and the handle with its carrier-arm-engaging spring pin 38 is moved in the direction of the arrow from position I to position II when it is halted by the engagement of the succeeding arm 37 by the detent 35, the latter having been pressed down into engaging position again by its spring after the arm 33 of the handle-lever has moved from beneath the pin 34 on the advance of the handle w from position I to position II. The handle w is then swung back to position I, the spring pin 38 snapping over the succeeding carrier arm 37 and serving to so tilt the handle on its pivot 32 that the arm 33 is brought beneath the pin 34 of the detent 35. It will be noted that the oscillation of the handle on its pivot 32, is limited by the stop pin 39 on the ring v, and located in the recess 40 in the handle.

It will be observed that in both forms shown in Figs. 5–6 and 7–8 the open notch of the carrier from which the cooled mandrel is taken remains in position to receive the same mandrel returned heated from the work of the rollers, and that the carrier is not shifted on its axis until after the carrier has received back the heated mandrel.

Within the scope of my invention, as pointed out by the subjoined claims, various modifications of the mechanism for raising and lowering the mandrel carrier will readily suggest themselves.

I claim as my invention:—

1. In a tube rolling mill a mandrel and a mandrel slide, a cooling trough beneath the mandrel in its withdrawn position, a mandrel carrier and means for raising and lowering said carrier between the mandrel slide and cooling trough, for the purpose specified.

2. In a tube rolling mill a mandrel and a mandrel slide, a cooling trough beneath the mandrel in its withdrawn position, a mandrel carrier and means in connection with the mandrel slide for raising and lowering said carrier between the mandrel slide and cooling trough, for the purpose specified.

3. In a tube rolling mill a mandrel and a mandrel slide, a cooling trough beneath the mandrel in its withdrawn position, a mandrel carrier mounted on a rotatable axis and means for raising and lowering said carrier between the mandrel slide and cooling trough, for the purpose specified.

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

ADOLF ALEXANDER KARL NOWAK.

Witnesses:

AUGUST OOSTERMAN,

MARIA FLÄTTIG.