W. H. SOMMER.

ROLLING MILL.

APPLICATION FILED NOV. 25, 1918.

1,370,063.

Patented Mar. 1, 1921.

3 SHEETS—SHEET 1.

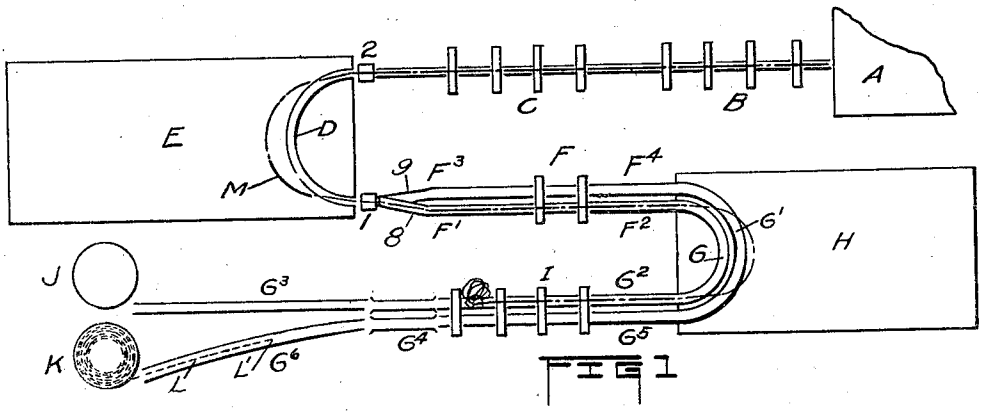


FIG 1

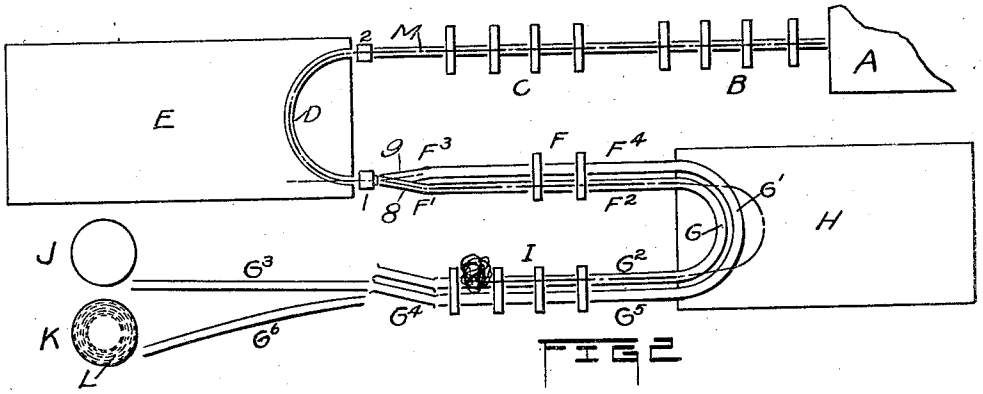


FIG 2

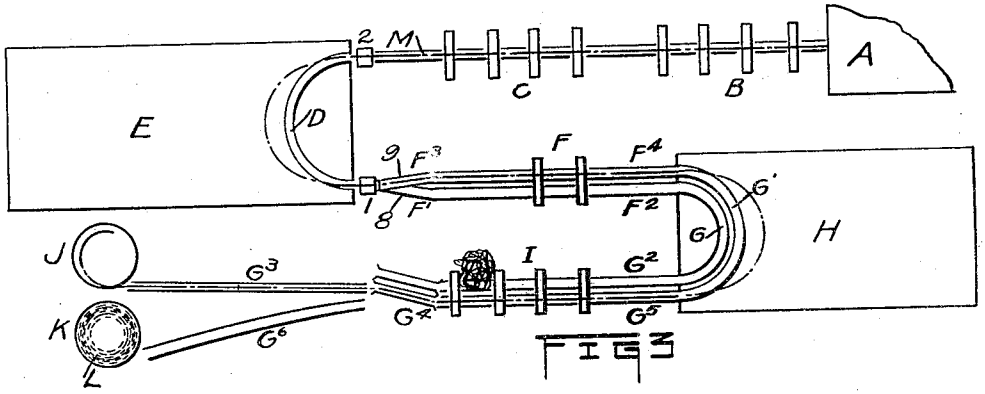


FIG 3

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3 SHEETS—SHEET 2.

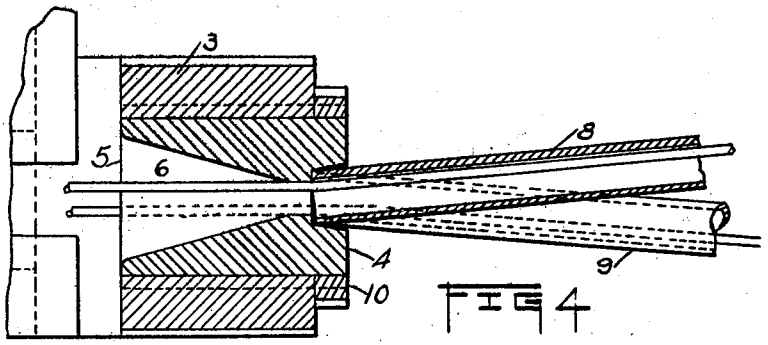


FIG 4

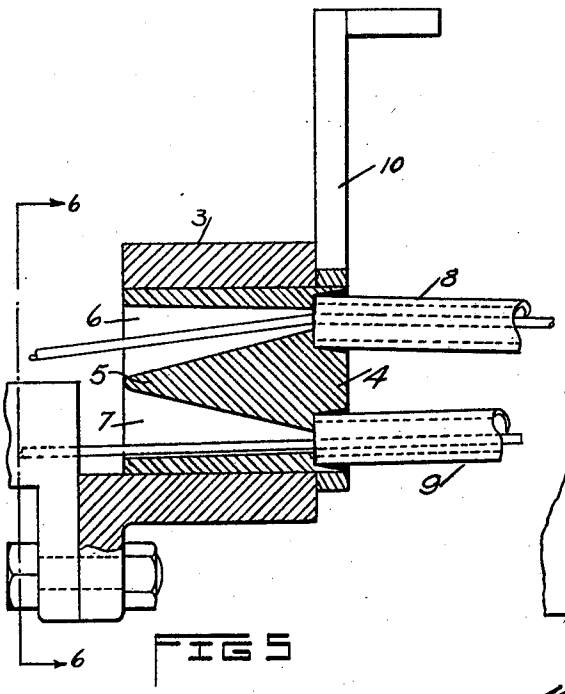
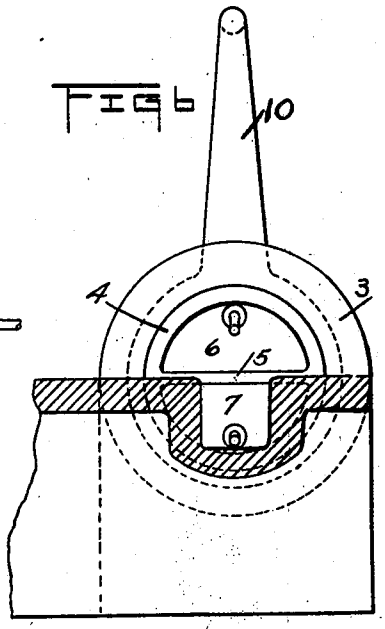


FIG 5

FIG 6



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3 SHEETS—SHEET 3.

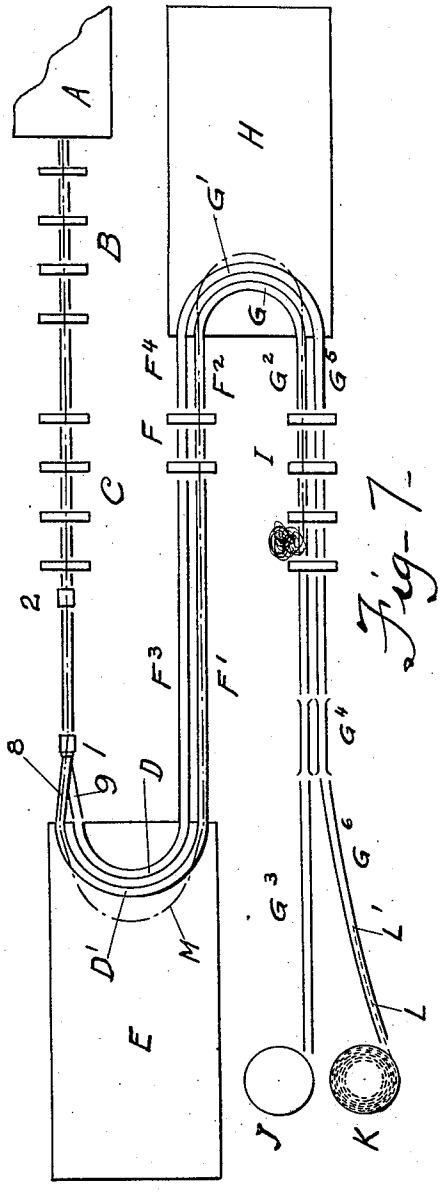


Fig. 1.

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UNITED STATES PATENT OFFICE.

WILLIAM H. SOMMER, OF PEORIA, ILLINOIS, ASSIGNOR TO THE KEYSTONE STEEL & WIRE COMPANY, OF PEORIA, ILLINOIS, A CORPORATION OF ILLINOIS.

ROLLING-MILL.

1,370,063. Specification of Letters Patent. Patented Mar. 1, 1921.

Application filed November 25, 1918. Serial No. 264,056.

To all whom it may concern:

Be it known that I, WILLIAM H. SOMMER, a citizen of the United States, a resident of Peoria, in the county of Peoria and State of Illinois, have invented new and useful Improvements in Rolling-Mills, of which the following is a specification.

This invention has reference to improvements in continuous rolling mills for hot metal, and relates particularly to mills for rolling rods from billets received direct from a furnace.

The invention has for its principal object to overcome the excessive loss in metal, in mills of the character referred to, resulting from "cobbles" occasioned by the failure of the billet to enter a roll.

My invention comprehends a switch located in the path of travel of the billets, by means of which, successive billets may be caused to momentarily overlap and be diverted into different paths of travel; and a shear, preferably of that type known as a "flying-shear," located in the path of travel of the billets and which is operated immediately upon the occurrence of a "cobble"; whereby the "cobbled" end of the billet may be severed from the strand, the remainder of the billet continuing on through the switch, and being diverted into a different path of travel from that of the "cobbled" portion of the billet, and being wound on the reel; the loss thereby sustained by reason of such "cobble" being very small.

This application is a companion to that filed by me on the 6th day of November, 1918, bearing Serial No. 261,334, in which I have shown and claimed the within described switch for diverting successive strands of metal from a common path of travel alternately into different paths of travel, whereby in a "single-strand" mill each successive strand of metal may momentarily overlap its preceding strand and thereby increase the production of the mill.

That the invention may be more fully understood reference is had to the accompanying drawings, forming a part of this description, in which:—

Figure 1 is a diagrammatic plan view illustrating a rod mill equipment, with my invention applied thereto, and showing a "cobble" occuring at the last roll of the finishing rolls, the switch having been thrown immediately after the billet entered the same, and the "flying-shear" operated to sever the billet in two, immediately the "cobble" happened;

Fig. 2 is a view similar to Fig. 1, except that it shows how, when the "cobble" happens, and the "flying-shear" is operated, the rear end portion of the severed billet may enter the switch, overlapping the rear end of the "cobbled" portion of the billet and be diverted into a different path of travel to that of the "cobbled" portion of the billet, without any loss of time, interference, or great loss of metal;

Fig. 3 is a view similar to Figs. 1 and 2, but more nearly like Fig. 2, and shows the complete "cobbling" of the severed portion of the billet, while at the same time the main portion of the billet is continuing through the mill and the finished rod is being wound on the reel;

Fig. 4 is a cross-section in plan, showing one form of switch-mechanism for diverting the rods;

Fig. 5 is a vertical cross-section through the switch;

Fig. 6 is an elevation, partly in section, as the same would appear on the lines 6—6 of Fig. 5, and

Fig. 7 is a diagrammatic plan view somewhat similar to Fig. 1, except that I have shown the switch and flying shear located between the first repeater and the furnace, requiring two grooves in the repeater, as in the case of the second repeater.

Like characters of reference denote corresponding parts throughout the figures.

In each of the Figs. 1, 2 and 3, the furnace is designated A; the two sets of roughing rolls as B and C; the two sets of finishing rolls as F and I; the "repeater" between the rolls C and F, as E, having the groove D, and the "repeater" between the rolls F and I, as H, having the grooves G and G′. Between the furnace A and the "repeater" E the successive billets travel through the same guides or path of travel, and between the "repeater" E and reels J and K the billets may travel through different guides or over different paths of travel, the same designated as F′ and F^3 between the "repeater" E and rolls F; as F^2 and F^4 between the rolls F and "repeater" H; as G^2 and G^5 between the "repeater" H and the rolls I, and as G^3 and G^6 between the rolls I and the respective reels J and K. A switch G^4 is located adjacent the last roll of the finishing rolls I and is so arranged that two strands

leaving the rolls I may be directed through guides or over the paths of travel G^3 and G^6 to the respective reels J and K, or the switch may be thrown so as to divert strands leaving the last roll of the series I to either the reel J, or the reel K.

Preferably at the point where the billet leaves the "repeater" E, I provide the switch mechanism 1, and preferably at the point where the billet enters the "repeater" E, I provide the "flying-shear" mechanism 2. I have not thought it necessary to detail the character of the "flying-shear" 2, as their construction and mode of operation is well understood by those skilled in the art. I prefer, however, to illustrate a simple form of switch for diverting the billets as they leave the "repeater" E, which comprises the barrel 3 in which is supported to oscillate, the member 4 divided by a partition 5 to provide the funnel-like passes 6 and 7. Communicating with the small end of the pass 6 in the member 4, is an oscillatory guide 8 which also communicates with the guide F′, and communicating with the small end of pass 7 in the member 4, is an oscillatory guide 9 which also communicates with the guides F^3. The member 4 may be oscillated by means of a lever 10, to alternately transpose the passes 6 and 7.

For convenience, and to better understand the operation of the mill, I have illustrated one billet by a dotted-line (. . .) L, and illustrated another billet by a dash-dot line (–. –.) M. With this explanation, the operation would be as follows:—We will assume that the billet L on leaving the "repeater" E entered the lower pass 7 in the switch 1, and then followed a path of travel designated by the parts 9, F^3, F, F^4, G′, G^5, I, G^4, G^6 and was wound on the reel K, and at any time after the forward end of the billet L entered the switch 1 and passed therethrough, but preferably immediately thereafter, the operator oscillated the member 4 to transpose the positions of the passes 6 and 7 therein; however, without interfering with the path of travel of the billet L from the switch through guides 9, F^3, F, F^4, etc. Immediately upon the rear end L′ of the billet L leaving the furnace A, the front end (shown "cobbled") of the billet M would leave the furnace and enter the rolls B, abutting the rear end L′ of the billet L. Although not shown, the rear end portion of the billet L will describe quite an extensive loop in the "repeater" E, but the front end of the billet M will cling close to the groove D in the "repeater" E and enter pass 6, in the switch 1, which would then be where the pass 7 is now shown in Fig. 5, and from such pass the billet M would follow a path of travel designated by the parts 8 F′, F, F^2, G, G^2, I, G^3 and be wound on the reel J. It is understood that the switch 1 together with the oscillatory guides 8 and 9 and communicating guides between the rolls F and "repeater" H, and between the "repeater" H and the rolls I will permit the billets L and M to overlap and pass, as shown, whereby there is no delay between the billets at the rolls B when they leave the furnace.

As further illustrating the operation of the respective elements of the equipment and the relation of the "flying-shear" 2 and the switch 1, I have shown in Fig. 1 that the front end of billet M "cobbled" at the last roll of the finishing rolls I; whereas the rear end portion of the billet L continued on through said last roll and is being wound on the reel K. The operator, observing the "cobble" of billet M, immediately operates the "flying-shear" 2, severing the billet M in two and also oscillates the member 4 of switch 1 to transpose the positions of the passes 6 and 7 therein. This will permit the forward severed portion of the billet M, which is of only a short length, to "cobble" at said last roll, while the front end portion of the rear section of the billet M, will enter the pass 7, in the switch 1, which would then be where the pass 6 was located, and be directed through the guide 9 and caused to follow a path of travel designated by the parts F^3, F, F^4, G′, G^5, I, switch G^4, guide G^3, and wound on the reel J, the switch G^4 being thrown after the last end portion of the billet L passed therethrough and in sufficient time to divert the uncobbled portion of the billet M to the guide G^3 and reel J, as shown in Figs. 2 and 3.

It must be obvious that without the switches G^4, and 1, and particularly the latter, and also without the shear 2, in a mill of the character shown, when a "cobble" occurs, the entire billet would "cobble" creating a considerable loss, not only of metal, but also in the time required to remove the mass of metal and open up the passes so as to permit another billet to be rolled. With the use of my invention when a "cobble" occurs, the operator acting quickly may reduce the loss in metal to a minimum, and without loss of time, as the operation of the shear 2 and the switch will permit the rear section of the severed portion of the billet to continue on through the mill, overlapping, at least momentarily, the rear portion of the "cobbled" end portion of the billet and being diverted by the switch G^4, may be wound on one of the reels, and during such continued operation, the "cobbled" mass may be removed.

As previously stated, I am not particularly concerned about the detail construction of the shear 2, as any one of several well known makes may be employed; neither am I concerned about the detailed construction of the switch G^4, or the switch 1, ex-

cept that the latter must be so constructed that after a billet enters the same it may be thrown to permit another and succeeding billet to enter the same and overlap the preceding billet, in manner and for the purposes explained.

While I have shown the switch 1 in Figs. 1, 2 and 3 adjacent the point where the billet leaves the "repeater" E, and the "flying-shear" 2 in said Figs. 1, 2 and 3 adjacent the point where the billet enters the "repeater" E, it is possible to locate the switch 1 where the "flying-shear" 2 is now positioned, and to locate the "flying-shear" at a suitable point between the "repeater" E and the furnace A. Such an arrangement is shown in Fig. 7. It only is necessary to provide the "repeater" E with two grooves, D and D′, arranged in a manner similar to the arrangement of the grooves G and G′ on the "repeater" H. The switch 1 is constructed as heretofore described and operates in the same way it is intended it should operate when located as shown in Figs. 1, 2 and 3.

What I claim is:—

1. The method of preventing excessive "cobbling" of metal strands in a rolling mill, which consists in severing a strand into sections to separate the "cobbled" portion of the strand from the uncobbled portion, and diverting the separated portion of the strand, during a continuous operation, into a different path of travel.

2. The method of preventing excessive "cobbling" of metal strands in a rolling mill, which consists in severing a strand into sections to separate the "cobbled" portion of the strand from the uncobbled portion, and diverting the separated portion of the strand, during a continuous operation, into a different path of travel, and overlapping the sections of the strand at the point of diversion.

3. In a mill of the character described, in combination with the reducing rolls and reels, means for diverting strands alternately to different reels, other means for diverting successive strands from a common path of travel alternately into different paths of travel, and means for severing a billet in two prior to the severed portions of the billet reaching said second mentioned means.

4. In a mill of the character described in combination with the series of rolls and winding reels, a switch for diverting strands alternately to the different reels, a second switch for diverting successive strands from a common path of travel alternately into different paths of travel, and a shear for severing a billet in two prior to the sheared portion of the billet reaching said last mentioned switch.

5. In a mill of the character described, in combination with the series of rolls and winding reels, a switch beyond the last roll of the series for diverting strands alternately to the different reels, a second switch interposed in the series of rolls for diverting successive strands from a common path of travel alternately into different paths of travel, and a shear for severing a billet in two prior to the sheared portion of the billet reaching said last mentioned switch.

6. In a mill of the character described, in combination with the series of rolls and winding reels, a switch adapted to receive successive strands from a common path of travel and divert the successive strands alternately into different paths of travel, said switch having two passes which are adapted to be transposed at the will of an operator, and a shear for severing a billet in two.

In witness whereof, I have hereunto affixed my hand this 19th day of November, 1918.

WILLIAM H. SOMMER.