(No Model.) 2 Sheets—Sheet 1.

W. D. HOUGHTON.

MILL FOR ROLLING WIRE RODS, HOOPS, OR STRIPS.

No. 306,619. Patented Oct. 14, 1884.

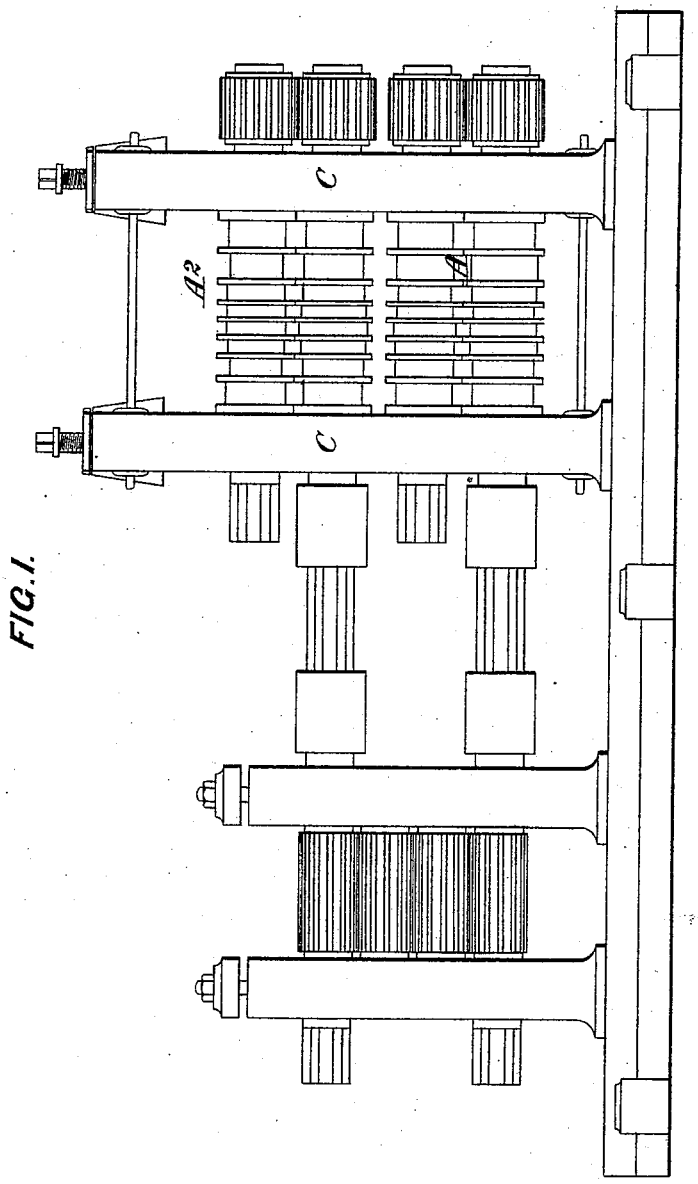

FIG. 1.

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Inventor:
William D. Houghton
by Marcellus Bailey
his attorney

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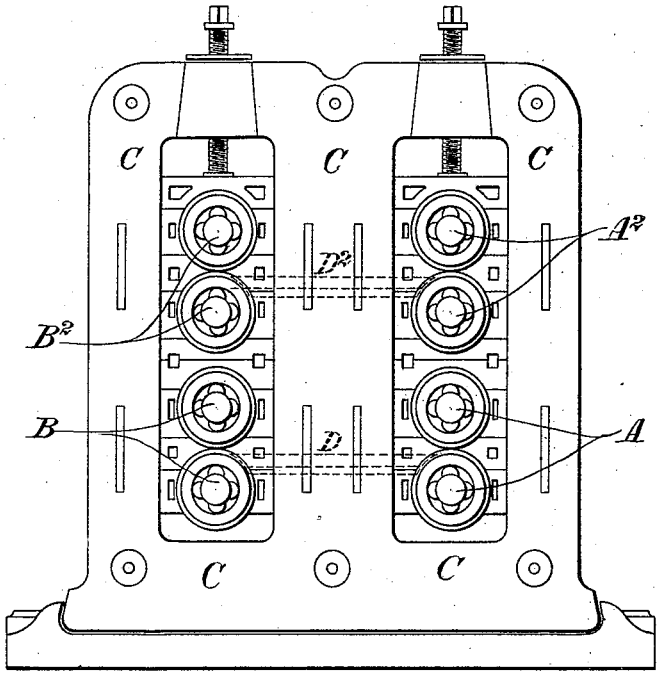
FIG. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM DICKSON HOUGHTON, OF SANKEY WIRE MILLS, WARRINGTON, COUNTY OF LANCASTER, ENGLAND.

MILL FOR ROLLING WIRE RODS, HOOPS, OR STRIPS.

SPECIFICATION forming part of Letters Patent No. 306,619, dated October 14, 1884.

Application filed April 12, 1884. (No model.) Patented in England January 24, 1884, No. 2,033.

To all whom it may concern:

Be it known that I, WILLIAM DICKSON HOUGHTON, a subject of the Queen of Great Britain and Ireland, and residing at Sankey Wire Mills, Warrington, in the county of Lancaster, England, have invented certain Improvements in Mills for Rolling Wire Rods, Hoops, or Strips, and the like, (for which I have obtained a patent in Great Britain, No. 2,033, dated January 24, 1884,) of which the following is a specification.

The ordinary wire-rod mills consist of single horizontal trains of rolls, most of which are placed three high—that is to say, three, one above the other—for the purpose of obtaining a reverse motion of the rolls. The bar to be rolled is put in by hand quickly from both before and behind the train, and as the rod in course of reduction becomes lengthened it is frequently passing through six rolls or more at a time. In these mills complications are avoided and the working is simple and stoppages seldom occur; but the said mills are slow in output and occupy much lateral space. The universal mode of reducing the rolls, being by means of square, diamond, and oval grooves in the rolls successively acting upon the rods, requires the workman to be careful in putting the end of the rod into the rolls, and he has to turn or twist the rod in every pass and adapt it to the changed form of next groove to avoid the edges getting where the flat portions ought to be. In rolling wire rods by a continuous mill, with the rolls placed either in a horizontal line or superposed over the other, the use of square, diamond, or oval grooves requires twisted guides, or the rolls must be placed horizontally and vertically alternately. In either cases complication and difficulty in working are caused. The difficulty in working is also greatly increased by the draft or take-up of the wire from one roll to the other having to be obtained within a definite and limited space, all the guides having to be accurately calculated both as to twist and length, for the slightest variation in these respects causes stretching or breaking and injury to the metal rolled. In a continuous mill of more than two sets of rolls the speed of the first and second rolls is necessarily limited to the length the remaining rolls are capable of taking up as the wire is delivered. In a continuous mill of, say, fourteen or sixteen pairs of rolls, the rod must pass very slowly through the three or four first rolls, and must gradually increase to the end if the rod is to be delivered hot, which is very essential in good rolling, so that the output of a continuous mill has never been much above, if any, that of an ordinary "three-high mill" run at high speed from beginning to end.

The object of my invention is to construct a mill which will combine the principal advantages of both the continuous mill and the reverse mill. I turn or groove the rolls so as to reduce the metal on its "flat and square," in order to dispense with any necessity for twist-guides, vertical rolls, and oval and diamond grooves as at present used, whereby I obtain a larger output of work with less liability to breakage and less complication than has hitherto been possible. By combining the principle of the continuous mill with that of the reverse mill, freedom to the metal at the end of the two or more sets of rolls is obtained, it being a well-known fact that the slightest accident at either the fore or back end of the ordinary continuous mill causes great damage to the mill, and it will be easily understood how inconvenient it is to take the metal from the rolls of one pair of housings to the rolls of another pair of housings and back again to the same rolls, as is done in other mills.

In arranging a mill according to my invention I have pairs of rolls all arranged in one set of housings, as shown in the accompanying drawings, of which—

Figure 1 is a front elevation, and Fig. 2 an end elevation, of a mill wherein the rolls are arranged according to my invention.

The first two pairs of rolls, A A^2, are placed one pair above the other, and the other two pairs, B B^2, are placed in like manner immediately behind and directly opposite to or in line with the rolls A A^2, all being contained in one set of housings, C, and being driven by special gearing, as shown in Fig. 1, to cause the upper sets of rolls, A^2 B^2, to deliver the metal the reverse way to that at which the rolls A B below deliver it. The metal having entered

the groove of the first or lower pair of rolls, A, it directs itself or is directed by a straight guide, as at D, into the groove of the second pair, B, after which it is sent on its return journey by being placed in the grooves of the upper set of rolls, B, from which it directs itself or is directed by the straight guide D^2 into the grooves of the rolls A^2. It is then placed in and passed through the smaller set of grooves of the pairs of rolls, and so on till the required dimensions of billet or rod are obtained. As before explained the grooves of the rolls are turned or grooved to take the metal on what is technically termed its "flat and edge," so that there is no necessity for either oval or diamond holes, twist-guides, or vertical rolls. There may be more than two sets of rolls arranged vertically, if desired. The grooves of the rolls which are opposite to each other or in the same horizontal plane are of the same figure, so that the rod has not to be turned between these opposite rolls. If hoops or flat strips are to be rolled, the grooves may all be of the same figure, and the strips be rolled without turning them at all. The final rolls will of course be grooved in accordance with the shape to be given to the finished wire.

Of course I do not limit myself to passing the rod through the lower rollers first, as it may be passed through the upper rolls first, if desired, the grooves being suitably arranged for this way of working.

The reason I prefer not to use more than two sets of rolls arranged horizontally is to avoid the complication necessarily attached to the arranging for the exact amount of delivery of one roll to another, and to enable me to run the rolls at a much quicker speed than can be possibly done if more than two sets are used.

The further advantage of two sets of rolls only in succession is that when the rod has attained sufficient length to be turned into the next rolls by hand it obviates any guide connection, and in this way may be running through the whole of the rolls at the same time, as in a continuous mill, with the advantage of uniform quick speed throughout. The superposing them by using four sets or two sets of rolls placed in the same line above each other is simply to economize space, which is an advantage over the ordinary plan of wire-rod mill.

I claim—

A mill for rolling wire rods, hoops, or strips, or the like, consisting of pairs of rolls arranged and grooved for reducing the metal in the manner hereinbefore described, and illustrated by the accompanying drawings—that is to say, arranged in sets of four high or more, one set being situated to the rear of the other set and the grooves being made to reduce by flat and square, for the purpose described.

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

WILLIAM DICKSON HOUGHTON.

Witnesses:
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