No. 838,781. PATENTED DEC. 18, 1906.

F. FORSBERG.

ART OF MANUFACTURING FLAT WIRE OR BANDS OF IRON OR STEEL.

APPLICATION FILED JULY 15, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

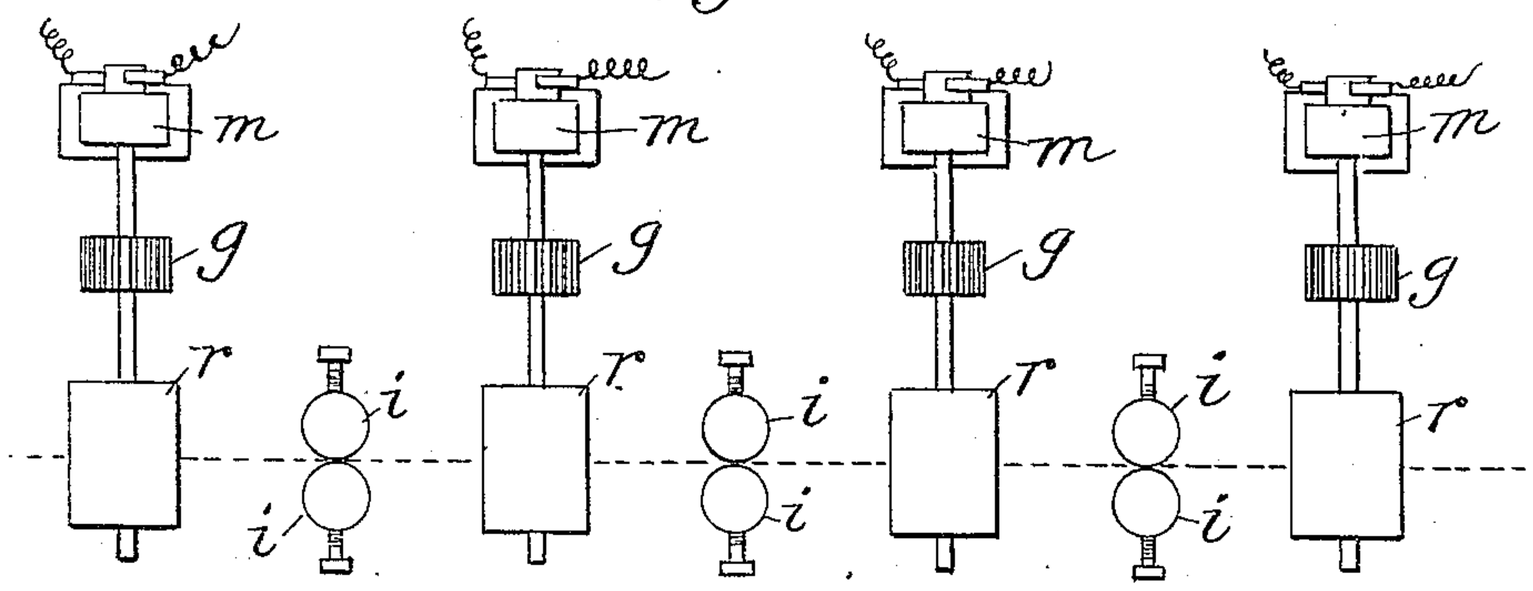


Fig. 2.

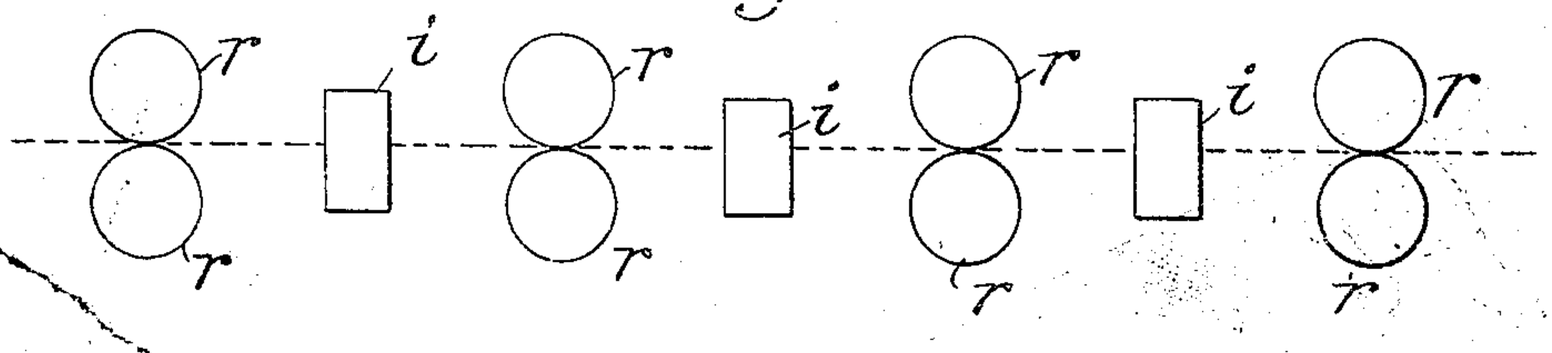
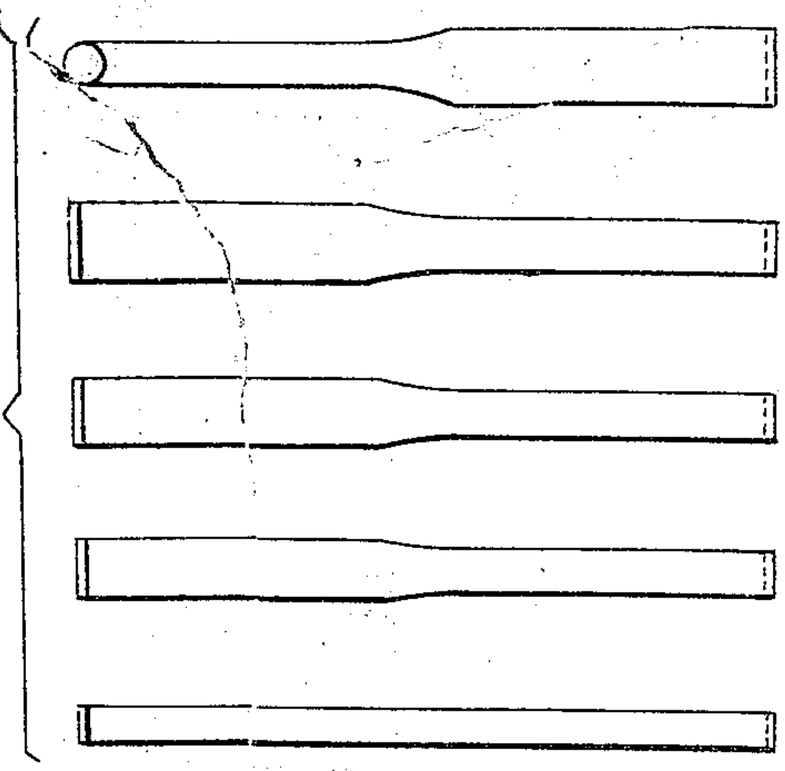


Fig. 4.



WITNESSES

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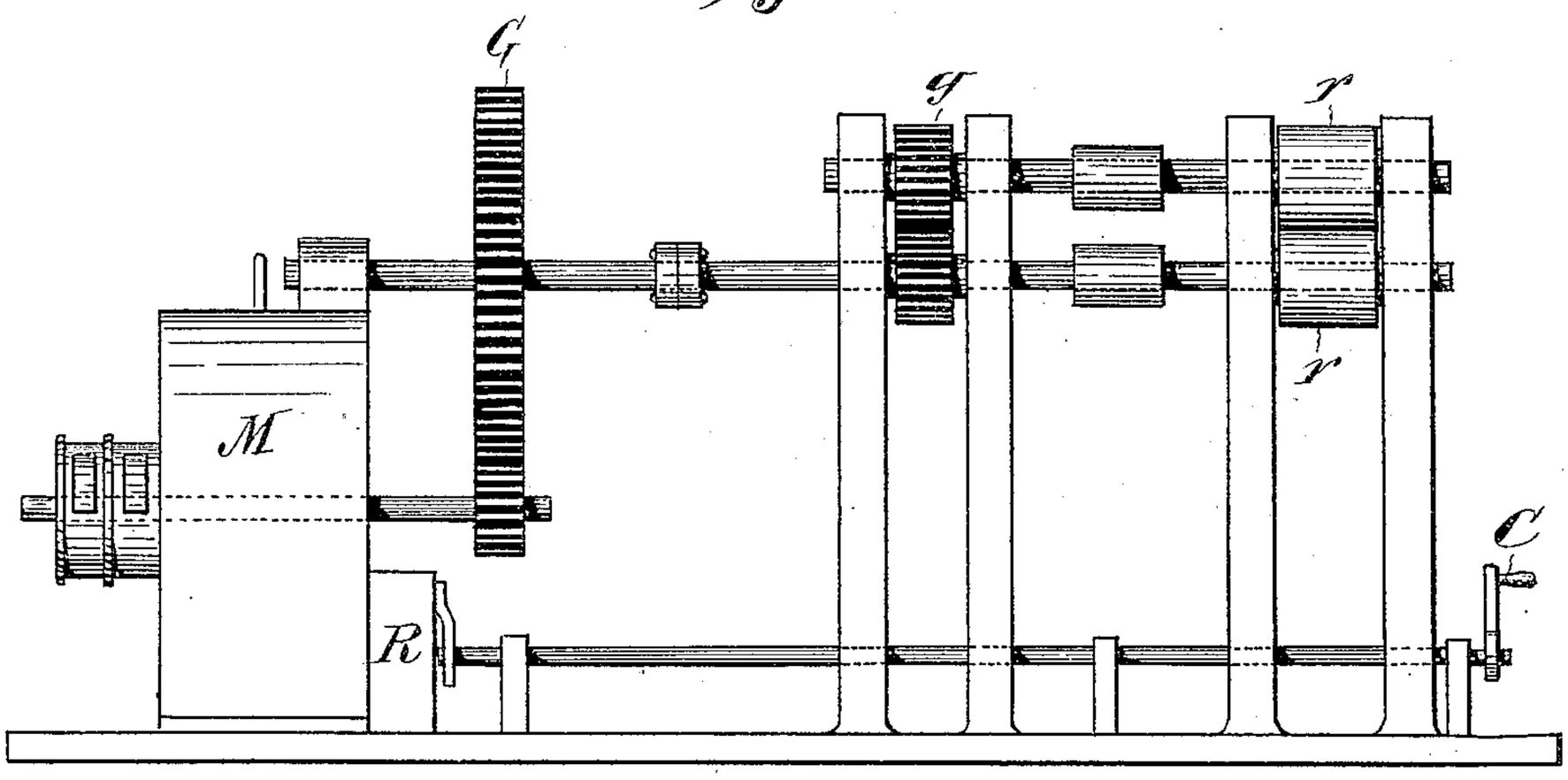
2 SHEETS—SHEET 2.

Fig. 3.



WITNESSES

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ART OF MANUFACTURING FLAT WIRE OR BANDS OF IRON OR STEEL.

No. 838,781. Specification of Letters Patent. Patented Dec. 18, 1906.

Application filed July 15, 1905. Serial No. 269,887.

To all whom it may concern:

Be it known that I, FREDRIK FORSBERG, a subject of the King of Sweden, residing at Sandviken, in the Kingdom of Sweden, have invented certain new and useful Improvements in the Art of Manufacturing Wire or Bands of Iron or Steel, of which the following is a specification.

This invention relates to the art of manufacturing flat wire or bands of iron or steel.

In my United States Letters Patent No. 769,603 I have described a method of manufacturing in a continuous manner iron or steel wires or bands of great length and small sectional dimensions by subjecting the stock to alternate roilerlng and roll-drawing operations. My above method was subject to two disadvantages—first, that it failed to reduce the wire to the smallest dimensions desired, and, second, that in order to employ the method for producing bands of different sizes it was necessary to change the machinery or have different machines for each size.

My present method is intended to improve my former method, first, by reducing the bands to much smaller dimensions than was possible by my former method, and, second, by enabling a single apparatus to be employed for producing different sizes of bands without changing the machinery at all.

In carrying out my present method of producing smaller sizes of bands than was before possible and of enabling one apparatus to be used for producing different sizes of bands without changing the machinery I prefer to employ an apparatus having alternating pairs of stock-driven rolls and positively-driven rolls, each pair of positively-driven rolls having a separate motive power with variable speed, so that the speed thereof can be regulated independently of the other pairs or rolls during the running of the machinery.

My present method consists in the novel manner of controlling the speed and pressure of the different sets of rolls, as will hereinafter appear.

In order to permit a clear understanding of my new method, I will now describe the same in detail.

The stock which is to be reduced is passed between the first pair of positively-driven rolls, (which are plain-faced,) and thereby partially flattened or reduced. The first set of idle rolls during this operation are separated from each other, and the partially-reduced stock is suitably guided or passed between said idle rolls without receiving any pressure therefrom. After being guided between the separated idle rolls the stock is gripped by the second set of positively-driven rolls and the speed of the positively-driven rolls is controlled to suit the elongation or reduction of the stock. The separated first two idle rolls are then brought into contact with the stock, so as to exert the desired pressure thereon. After this pressure of the idle rolls has been applied to reduce the stock further the speed of either the first or second set of driven rolls should be again regulated to compensate for the further elongation caused by the pressure of the idle rolls. It will be understood that this speed of the driven rolls has a certain relation to the pressure of the idle rolls—that is to say, when the pressure is great the speed of the driven rolls should be varied more than when the pressure of the idle rolls is less great. After passing the second set of driven rolls the stock is guided between the second set of separated idle rolls and is engaged by the third set of driven rolls. The speed of this third set of driven rolls is then regulated with relation to the first two sets of driven rolls to suit the elongation of the stock, and the second two idle rolls are brought into contact with the stock, after which a further regulation of the driven rolls is effected to suit the elongation caused by the pressure of the idle rolls. The above operation is repeated with all the succeeding sets of rolls. Now it is clear that when one wishes to have a very narrow size of band one must put on all the pressure upon the idle rolls that the stock will allow before bursting and regulate the speed of the motor-driven rolls according to that pressure, and thereby one is able to reduce the size so far as the tensile strength of the hot iron will allow. On the other hand, if one wishes to have a somewhat larger size he puts on a less pressure upon the stock-driven rolls, and regulates the speed of the motor-driven pairs of rolls according to this pressure and the resulting elongation. Thus only by regulating the speed of the motor-driven rolls according to the pressure upon the stock-driven rolls one is able to get all the sizes the stock will allow.

One form of apparatus suitable for carry-

ing out the improved method of this invention is illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatic plan view of an apparatus having alternate pairs of idle and driven rolls, each pair of driven rolls having independent and variable motive power. Fig. 2 is a side elevation. Fig. 3 is a view in elevation of one pair of driven rolls with the motor and means for varying the speed thereof. Fig. 4 is a view showing the manner in which the stock is successively reduced by the different sets of rolls.

In Fig. 3 of the drawings, M designates an electric motor; R, a variable-resistance device; C, a crank for controlling the resistance and varying the speed of the motor; G and *g*, gearing for driving the rolls from the motor, and *r r* the rolls. Four motors, such as shown in Fig. 3, are illustrated in Figs. 1 and 2; but it will be understood that the number can be varied.

The letters *i i* in Figs. 1 and 2 designate the idle rolls which are provided for controlling the pressure on the stock. It will be understood that the stock is thoroughly heated before it is treated in accordance with the present process.

What is claimed is—

The method of reducing hot iron or steel to flat strips, which consists in feeding the stock between driven plain-faced rolls, then passing the advancing reduced end of the stock between separated roll-drawing surfaces and between a second pair of driven rolls, controlling the relative speed of said driven rolls to suit the elongation of the stock, then bringing the roll-drawing surfaces into contact with the stock, so as to reduce the cross-sectional area thereof, and then adjusting the relative speed of the driven rolls to compensate for the additional reduction accomplished by the roll-drawing surfaces.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

FREDRIK FORSBERG.

Witnesses:

ROBERT APELGREN,

AXEL EHRNCR.