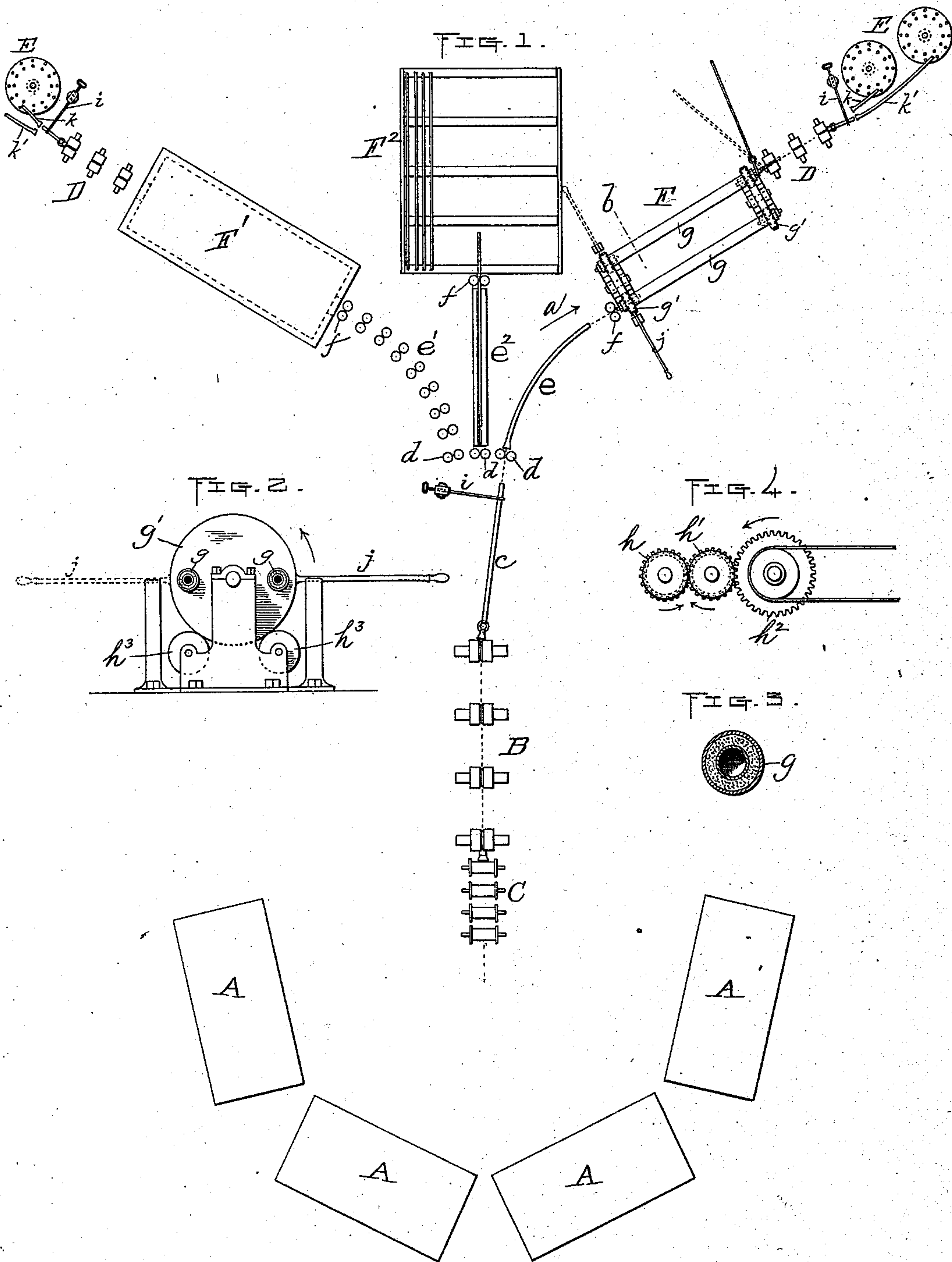


(No Model.)

C. H. MORGAN.  
ROLLING MILL PLANT.

No. 379,974.

Patented Mar. 27, 1888.



Witnesses;

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# UNITED STATES PATENT OFFICE.

CHARLES H. MORGAN, OF WORCESTER, MASSACHUSETTS.

## ROLLING-MILL PLANT.

SPECIFICATION forming part of Letters Patent No. 379,974, dated March 27, 1888.

Application filed January 30, 1888. Serial No. 262,323. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES H. MORGAN, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Rolling-Mill Plants; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 represents a top or plan view of a rolling-mill plant embodying my improvements. Fig. 2 is an end view, upon an enlarged scale, of a transferring device used in connection with my aforesaid improved plant, looking in the direction of arrow *a*, Fig. 1. Fig. 3 is a transverse section through a portion of said transferring device upon a still larger scale, taken on line *b*, Fig. 1; and Fig. 4 is a plan view showing one method of driving the feed-rolls of my improved plant.

My invention relates more particularly to rolling-mill plants for the production of what are commonly known as "wire rods;" and it consists of the improved system of furnaces, reducing-rolls, and feeding, transferring, storing, and coiling mechanism, hereinafter set forth.

In order that others may fully understand the nature and purpose of said improvements, I will now proceed to give a detailed description thereof.

In the drawings, A A A A represent a series of ordinary furnaces for heating the billets in the manufacture of wire rods, which are in this instance ranged in a semicircle in front of the continuous train of rolls B for partially reducing said billets. Prior to entering between said rolls B the billet passes over a series of supporting and carrying rolls, C, and, as it leaves the last set of rolls of said train partially reduced, it enters a swivel conducting-pipe, *c*, whereby it is guided in between a set of feed-rolls, *d*, thence by another suitable guide, *e*, *e'*, or *e''*, in between another set of feed-rolls, *f*, which feed said billet into or onto a suitable storage receptacle or device preparatory to being further reduced to the size of a wire rod by the continuous trains of rolls D D. As the finished rod issues from between the last set of rolls of one of said rod-trains, it is

guided onto a suitable automatic reel, E, three of which are shown in this instance, and coiled thereon by the rotation of said reel. Such, in brief, is the general arrangement of the several elements composing my improved plant, and which comprises the essential feature of my invention.

Various modes of construction may be adopted in carrying out said invention in practice, and I therefore do not limit myself to any particular construction. For this reason I have shown simply in skeleton form the various parts or groups of parts required to illustrate my said invention.

F represents a combined storing and transferring device, and consists of a pair of tubes, *g g*, mounted longitudinally in circular frames *g' g'* at the ends. Said frames are each in turn supported on a pair of friction-rolls, *h<sup>s</sup> h<sup>s</sup>*, fitted to turn in suitable stationary bearings. When the device is in its normal position, the tubes *g g* are both upon the same horizontal plane, as shown in Fig. 2, with one tube in line with the feed-rolls *f* and the other with the train of rolls D, as shown in Fig. 1.

F' represents an ordinary heating-furnace similar to the furnaces A, and F<sup>2</sup> is what is termed a "hot-bed," consisting of a series of transverse or cross bars, upon which the billets may be placed for temporary storage as they are delivered from the train B in case of the derangement of any of the machinery employed for further reducing said billet. In practice said hot-bed bars may be held in position by partially embedding them in the ground or by fastening longitudinal bars to the ends thereof.

I have shown three different ways in which the billets may be conducted from the billet-train B to the aforesaid device F, furnace F', or hot-bed F<sup>2</sup>, consisting of a pipe, *e*, a series of rolls, *e'*, and an open trough, *e''*; but I prefer in practice the pipe *e*, for the reason that the metal, being inclosed, is prevented from cooling in passing between the points named. It is also preferable to employ a device F rather than a furnace F' between the train of rolls D D and said conducting-tubes *e*, as reheating of the metal after leaving the rolls B would ordinarily be unnecessary to pass through the subsequent stages of reduction in



producing the wire rods. The protection of the billets after being deposited in the tubes *g* may be facilitated by making said tubes, as shown in Figs. 2 and 3, with an inner and 5 outer casing, and filled in between with asbestos or other non-conductor of heat.

The feed-rolls *d* and *f* may be operated in any convenient and well-known way. In Fig. 4 I have shown one method of driving said 10 rolls by means of a chain of spur-gears, *h h' h''*, intermeshing one with another, and which may in turn be driven in any well-known way.

It is preferable in practice to combine two or more rod-trains *D D* and their respective 15 conducting devices and reels with the train of rolls *B*, so that the billets may be passed on for further reduction to one and then the other of said rod-trains and their reels as fast as delivered from said train *B*. Being thus delivered in rapid succession, owing to the use of 20 several furnaces *A*, as previously described, it is obvious that the production of the mill is very materially increased over the ordinary mills in common use.

25 As the hot-bed *F*<sup>2</sup> is not an essential feature of my invention, I reserve the right to use the same or not, as desired.

The operation of reducing a billet to a wire rod by the use of my improved plant may be 30 briefly summed up as follows: The attendant first removes the billet from one of the heating-furnaces *A* in the usual way and deposits it on the feeding or carrying rolls *C*. Said rolls then carry it forward between the first 35 set of reducing-rolls of the train *B*, when it is then continued to be fed forward and reduced by said rolls and each succeeding set of rolls of said train in the usual way. Upon issuing from the last set of rolls the billet enters and 40 passes through the swivel guide-pipe *c*, which has previously been swung in line with one of the sets of feed-rolls, *d*, by means of the operating-rod *i*, connected with the forward end thereof. Being now passed in between said 45 feed-rolls, the latter feed it forward into and through the conducting-pipe *e* and in between the second set of feed-rolls, *f*, which in turn pass it forward and deposit it in the tubes *g* in line therewith. An attendant now turns the device 50 *F* one-half a revolution by means of a handle, *j*, thereon, as indicated in Fig. 2, thus bringing said filled or loaded tube in line with the train of rolls *D*. An attendant next grips the forward end of the partially-reduced billet by 55 means of a suitable swivel gripping device or tongs and draws it forward and inserts it between the first set of rolls of said train *D*, as indicated by full and dotted lines in Fig. 1, when said rolls and each succeeding set feed 60 forward and further reduce the billet, as in the former instance, to the size of a wire rod, which,

as it issues from the last set or finishing-rolls, is guided by a swivel device similar to the device *c*, previously described, into and through 65 a suitable conducting-pipe, *k* or *k'*, onto one of the reels *E*, upon which it is coiled between the double row of spokes *l* thereof as fast as delivered thereon, thus completing the operation. In practice it is preferable to employ two reels 70 for each train of rolls *D*, as shown at the right-hand side of Fig. 1, for the reason that while the coil is being formed upon one reel the one previously coiled on the other reel may be removed, and thus obviate any unnecessary delay in the rolling and coiling operations. 75

The various parts of the plant are so constructed in relation to one another that the forward end of each billet will enter between the feed-rolls *d* before its rear end leaves the last 80 set of rolls of the train *B*, and between the feed-rolls *f* before leaving said feed-rolls *d*. Therefore, after having been fed in between the first set of rolls of said train *B*, as previously described, the billet is passed forward automatically until it is deposited within one of the 85 protecting-tubes *g* of the device *F*. When thus deposited, the forward end of said billet projects beyond the front end of the device a sufficient distance for the attendant to grip and draw forward the same, as previously described. 90

For the purpose of convenience in illustration I have shown only a few sets of each train of rolls; but it will be understood that a considerable larger number are employed in practice, the additional number thereof being gov- 95 erned according to different circumstances and requirements.

Having described my improved plant, what I claim as new, and desire to secure by Letters Patent, is— 100

In a rolling-mill plant, the system of billet-heating furnaces *A*, supporting and carrying rolls *C*, and primary train of rolls *B*, for partially reducing the billets and delivering the same in rapid succession therefrom, in combination with two or more systems or apparatuses for further reducing said partially-reduced billets to wire rods and forming the same 105 into coils, consisting of the swivel guide-pipe *c*, feed-rolls *d*, conducting-pipes *e*, or their equivalents, feed-rolls *f*, storage receptacles or appliances *F F' F''*, the trains of rolls *D*, reels *E*, and suitable guides interposed between said storage receptacles or appliances and the rolls *D*, and between said rolls and the reels, all arranged for operation substantially as shown 110 and specified.

CHAS. H. MORGAN.

Witnesses:

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