

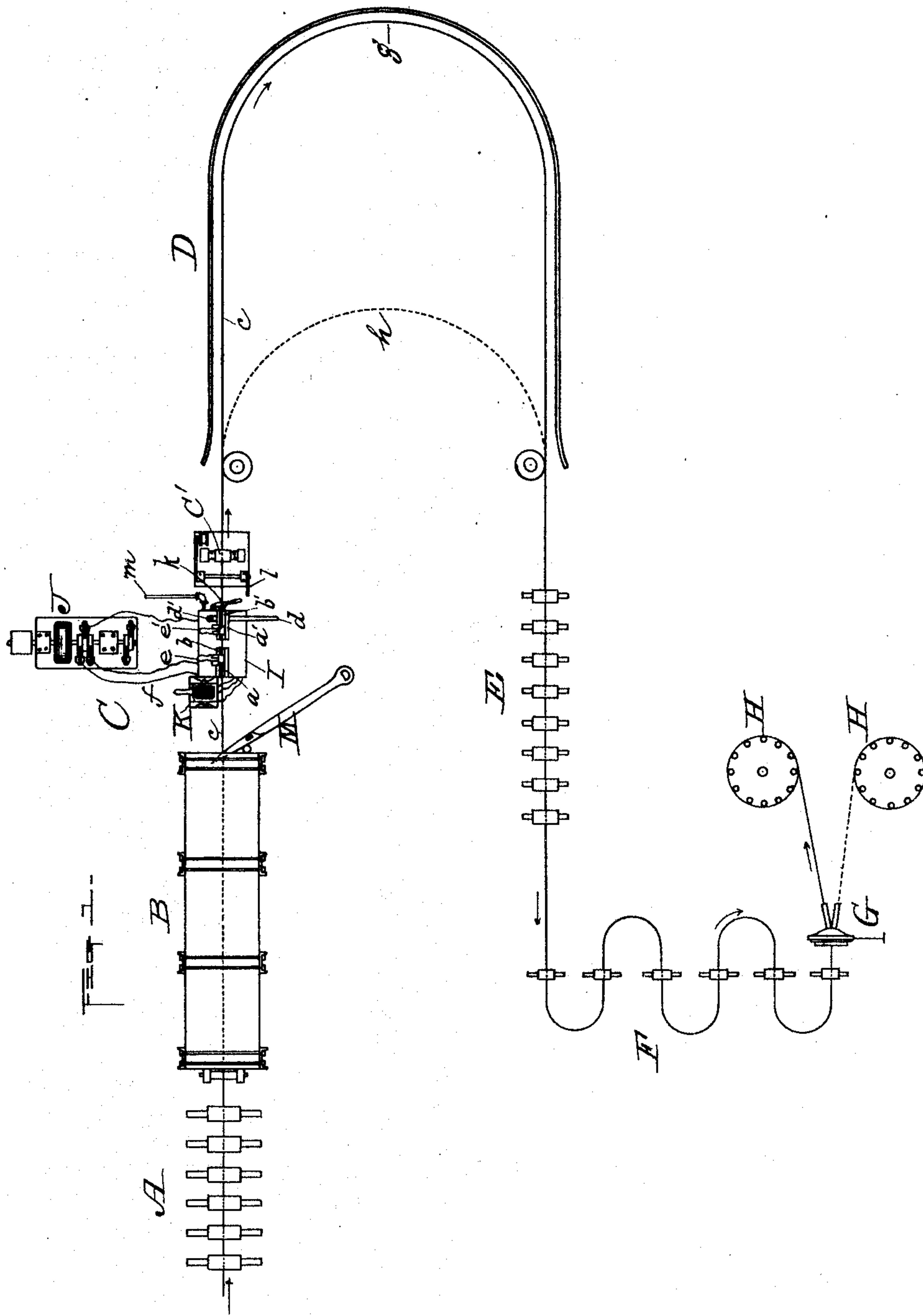
(No Model.)

3 Sheets—Sheet 1.

L. COOK.
ROLLING MILL PLANT.

No. 503,830.

Patented Aug. 22, 1893.



Witnesses,
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T. E. Buss

Inventor,
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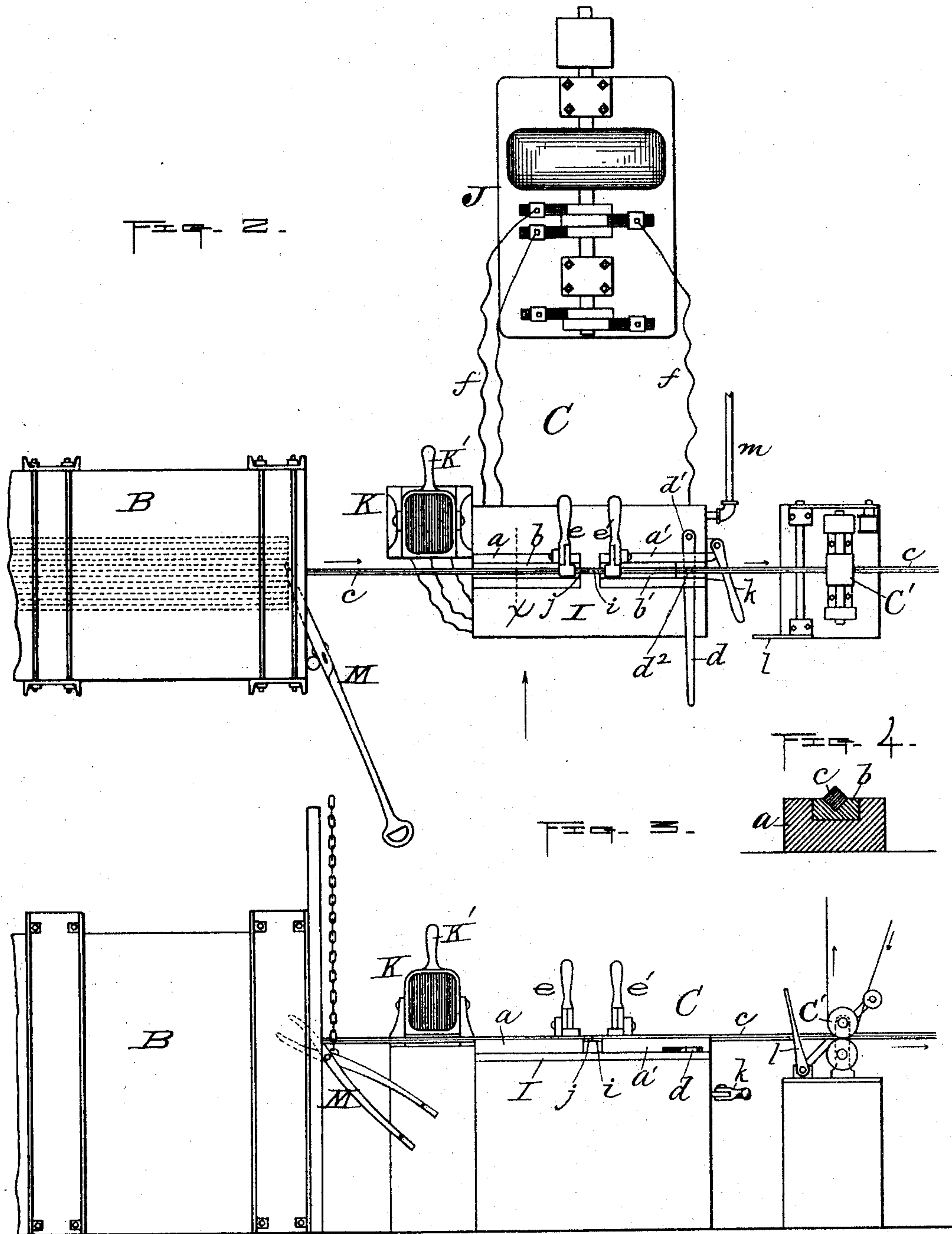
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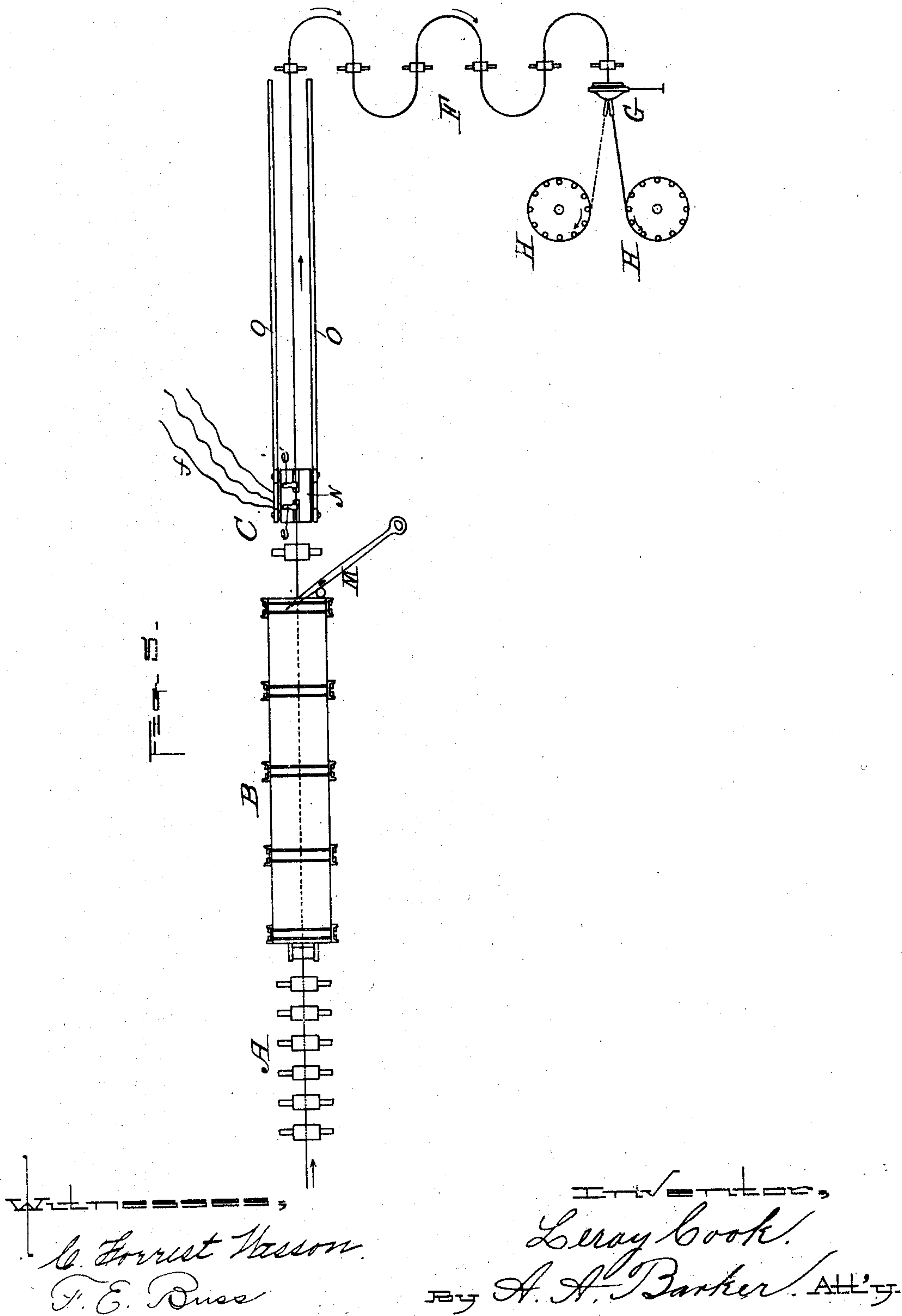
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UNITED STATES PATENT OFFICE.

LEROY COOK, OF WORCESTER, MASSACHUSETTS.

ROLLING-MILL PLANT.

SPECIFICATION forming part of Letters Patent No. 503,830, dated August 22, 1893.

Application filed May 16, 1892. Serial No. 433,085. (No model.)

To all whom it may concern:

Be it known that I, LEROY COOK, of the city and 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, in which—

Figure 1 represents a skeleton plan of a rolling mill plant embodying my improvements. Fig. 2 is a plan upon an enlarged scale, of that portion of the plant shown in Fig. 1, to which my invention more particularly relates. Fig. 3 is a front side view of the parts shown in Fig. 2. Fig. 4 is a transverse section upon a still larger scale taken on line *x*, Fig. 2, and Fig. 5 is a similar plan to Fig. 1 upon the same scale as said figure, showing a modification in the construction which will be hereinafter described.

Heretofore in making wire-rods and wire of unusual length, that is, longer than the usual length of billets when rolled down will produce, it has been customary, as is well known, to weld together the billets or rods independent of the rolling process, by forging and beating or brazing the ends together, and by heating the overlapping ends to be welded and then uniting the same by compression between rolls.

The main purpose of my invention, consists in combining suitable electric welding and feed mechanism with an ordinary rolling mill plant; said mechanism being interposed between the usual billet mill, and the usual rod, rolling mill, preferably with a storage, heating furnace between said mechanism and the billet mill, whereby the rear end of each billet that has passed through the billet mill, and the forward end of each one following, may be successively welded together without interruption of the rolling or reducing process, and thereby producing a continuous rod of any desired length, as will be hereinafter more fully set forth.

Following is a detailed description of my invention with reference to the accompanying drawings.

In said drawings A represents the billet rolling mill, B a storage heating furnace, C

the electric welding and feed mechanism, and D a partition or guard for keeping the welded billets within proper limits upon the floor prior to entering the rod rolling mill.

E is a continuous rod rolling mill, F a Belgian rod rolling mill, G a combined switch and cut-off device and H, H the reels upon which the completed rods are coiled.

With the exception of the electric welding and feed mechanism C, the various elements above referred to which constitute the completed plant, are of ordinary, well-known construction and operation, and are therefore as before stated, shown only in skeleton form, no claim being made to the special construction thereof.

In practice the "blooms" are passed through the billet mill A, and reduced to billets of the desired size and length, and then to rods, by passing through the rod rolling mill or mills, as ordinarily, except that instead of being treated independently in separate pieces, each successive billet is welded to the one following, as they are continuously fed forward, thus forming a continuous strand of any desired length, said length being limited only by the duration of the supply of billets and operation of the mill. I perform said welding operation by means of electricity applied to the two abutting ends of the billets to be united, in any suitable manner whereby said ends may be fused to a welding heat. As this result may be accomplished by means of various electrical appliances, I do not limit myself to any special construction, the main or essential feature which I desire to cover being the result attained for the purpose specified, rather than the special means employed to effect said result. The welding mechanism shown in the drawings, see more especially Figs. 2 and 3 is constructed, arranged and operated in the following manner: Upon the bed I, are mounted the stationary, longitudinal, grooved guides *a a'*, in which are fitted guide-plates *b b'* having longitudinal grooves in their upper sides to receive the billets *c*, (see cross-section Fig. 4.) The guide-plate *b* is preferably fastened in the guide *a*, while guide-plate *b'* is fitted to slide in guide *a'*, and is provided with an operating lever *d* pivoted to bed I at *d'* and to the guide-plate at *d''*, the purpose of which will be later described. To the inner end of

each guide-plate b b' are secured suitable clamping devices e e' adapted to clamp and release the abutting ends of the billets as required in welding said ends. The electric

5 current for fusing said abutting ends to a welding heat is supplied from a dynamo J, connected in a suitable manner by means of wires f with the parts to be operated upon.

I am aware that it is not broadly new to
10 weld two pieces of metal together by means of electricity, and therefore make no claim thereto, except for the purpose herein set forth.

The manner of applying the electric current from the dynamo being well understood, it is deemed unnecessary to illustrate or describe the same in detail. The part K represents an ordinary reactive coil for regulating the strength of the electric current, and C' a
20 pair of feed-rolls for feeding forward the billets after they are welded. Said rolls are, in practice, run at a high rate of speed, so as to feed the billets forward very rapidly in order to give time for performing the aforesaid welding
25 operation without stopping the rod rolling mills, the welding being done while the ends of the billets are held stationary in the interval between said rapid feed movement and the time occupied by the rod rolling mill in taking up the slack thereby produced. When
30 thus fed forward the last billets and those previously welded together are kept within proper limits by the partition or guard D, said welded billets first passing around just
35 inside of the guard, as shown by full lines g in Fig. 1, and then gradually drawn forward and shortened by the rod mill to the length shown by dotted lines h in said figure. By the time the slack has been taken up to this
40 point, the welding of the two ends has been accomplished, and the billet is again quickly fed forward and so on continuously, one billet after another being welded to the preceding one until the desired length of rod has
45 been produced. In welding the two ends together, the rear end i of the preceding billet is held in the clamp e' which is mounted on the slide b' so as to move with it; the new billet is then drawn out of furnace B by means
50 of the usual tongs M, and its forward end j is moved up against said rear end i and clamped by means of the clamp e . The operator then turns on the electric current by means of the switch k and taking the lever d
55 in his right hand, and the lever K' of the reactive coil K in his left hand, operates the latter to turn on the requisite strength of current for welding, and at the same time with his right hand by means of lever d holds
60 the ends of the billets in contact until they are properly welded together. He then throws back the lever K' and switch k , unclamps the billets, and operates the shipper lever l of the feed-rolls C' thereby causing said billets to be
65 fed forward ready for the next welding process, when the above operation is repeated.

In practice the feed-rolls are driven at a

high rate of speed so as to quickly feed the billets forward, as previously stated, and thus give time for the ends to be welded while
70 held stationary as aforesaid.

If desired, water may be supplied to the welding mechanism by a pipe m to keep the parts in a cool condition, but I do not limit myself thereto, or to the use of the storage
75 heating furnace B, although it is preferable to employ both in practice.

I also reserve the right to weld the two ends together while in motion, by supporting the same on a suitable carriage N, arranged to
80 travel on tracks O, O, as is shown in Fig. 5—the parts which support and clamp the ends of the billets being mounted on said carriage, and the latter provided in practice with suitable means for operating the same. By the
85 last described construction it is obvious that the billets may be passed directly to the rod-mill instead of spreading the same on the floor after being welded, the welding being done in this instance while the carriage is moving
90 forward.

Although practically the same result is attained by both ways the one first described is preferable, for the reason that the welding
95 may be better accomplished while the ends are held stationary, less attention is required from the operator and the cost of the plant is less than by the last described construction.

Another advantage of the stationary welding method over the other is, that the time
100 allowed for welding is not as limited, for the reason that by running out considerable slack before passing the front end of the first billet into the rolling mill quite a variation in time is allowed for performing the welding
105 operation; whereas, by the other method only the time occupied by the carriage in moving the length of one billet is allowed for performing said operation, and considerable time is also wasted in returning the carriage to its
110 original position next to the storage furnace. Said return movement may be performed by any suitable driving mechanism connected with the carriage.

It will of course be understood that both
115 the continuous and Belgian rod mills E, F, may be used in connection with my improvements, or either one separately, as may be required in practice.

The advantages of welding the billets and
120 reducing the same to rods continuously, as they are turned out by the billet mill, will at once be apparent to those skilled in the art to which my invention appertains.

The production may be greatly increased as
125 well as improved in quality, for the reason that, being run through in one continuous strand, there is less danger of "buckling" in passing from one pair of rolls to another, and no "fins" are formed in passing through the
130 rolls as is customarily the case. Therefore there is, practically no waste from this cause, or from cutting off the usual waste ends. Furthermore, a Belgian mill may be converted

into a continuous mill, and thereby increase the production of this class of mills.

5 The production of a continuous strand of any desired length, it is obvious is of especial advantage in the manufacture of copper rods for electrical purposes; and finally, less operators are required for a rolling mill plant thus equipped, and the danger to said operations is reduced to a minimum.

10 Having now described my invention, what I claim therein as new, and desire to secure by Letters Patent, is—

15 1. Combined rolling and welding mechanism comprising in combination the following elements, viz: a heating furnace; an electric welding device provided with suitable holding and feed mechanism, and suitable rod reducing rolls, substantially as and for the purpose set forth.

20 2. Combined rolling and welding mechanism

ism comprising in combination the following elements, viz: a series of billet reducing rolls; a heating furnace; an electric welding device provided with suitable holding and feed mechanism, and suitable rod reducing rolls, substantially as and for the purpose set forth. 25

3. The combination with the heating furnace and rod reducing rolls of a rolling mill plant, of an electric welding device interposed between said furnace and rolls, consisting of 30 an electric generator or motor and means for applying the current therefrom to the billets to be welded, suitable clamps for holding said billets and means for feeding the same forward, substantially as and for the purpose set forth. 35

LEROY COOK.

Witnesses:

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