

(No Model.)

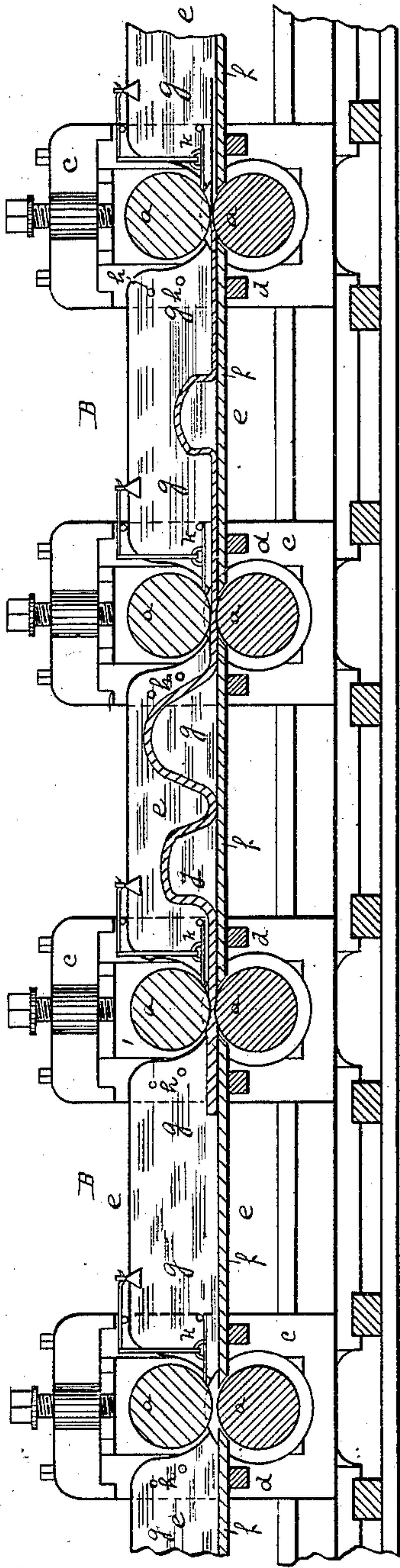
G. W. COBBETT & J. E. CUNNINGHAM.

CONTINUOUS ROLLING MILL.

No. 285,113.

Patented Sept. 18, 1883.

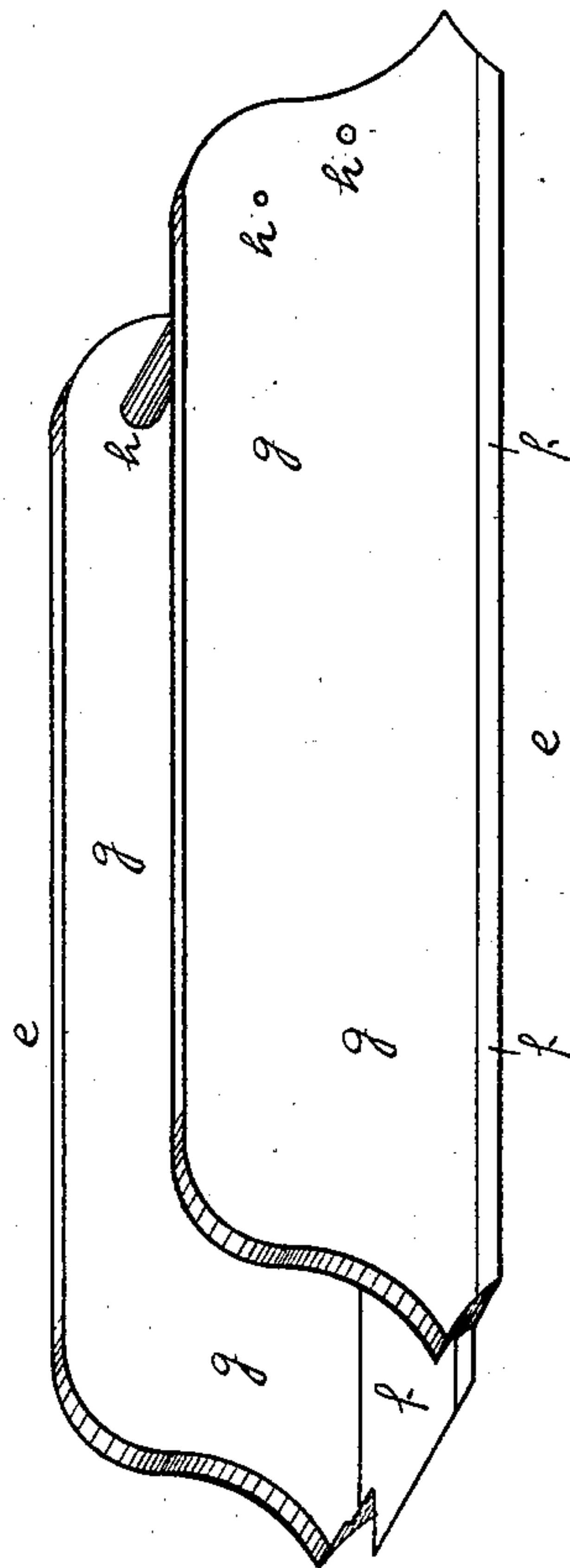
Fig 1.



Witnesses.

J. Cooke  
S. A. Mill

Fig 2.



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# UNITED STATES PATENT OFFICE.

GEORGE W. COBBETT AND JOHN E. CUNNINGHAM, OF CHARTIERS TOWNSHIP,  
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## CONTINUOUS ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 285,113, dated September 18, 1883.

Application filed April 4, 1883. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE W. COBBETT and JOHN E. CUNNINGHAM, of Chartiers township, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Continuous Rolling-Mills; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates to continuous rolling-mills employed for rolling hoop and other flat iron. In these continuous mills the rolls are placed in common line of feed, and suitable conductors are arranged between the several sets of rolls. The ordinary hoop-mill requires from four to seven of these sets of rolls in order to reduce the billet or pile to the required gage of the hoop, strip, sheet, or plate required. As the metal is elongated in each pass of the rolls, and is fed therefrom more rapidly than it enters therein, on account of its lengthening or elongation, it has been customary either to gear the rolls so as to run at different surface speed, and thus take up the metal lengthened or elongated, or else to place the rolls at such a distance apart that the metal left one set of rolls before entering the next set in the continuous mill, and was fed from one set to the next by feeding devices within the conductors. It is evident that both these constructions of continuous mills were objectionable, the first requiring very complicated and intricate gearing to regulate the different speeds of the rolls according to the elongation of the metal, and the second requiring such a length of mill for rolling the ordinary hoop or strip iron that it has been found impracticable.

The object of our invention is to provide a more simple construction of these continuous mills, suitable for rolling hoop or flat iron, and one whereby the whole continuous mill may be placed within a shorter distance.

It consists, essentially, in combining with a series of two or more pairs of rolls mounted in common line of feed a guide or conductor having such high walls or sides as will permit the metal delivered from one set of rolls and entering the next to buckle or bend up within the conductor, and so allow it to be delivered from the one set faster than it is taken up into

the next, and yet prevent any injury to the metal or delays in the operation of the mill on account of the metal jamming within the conductor.

To enable others skilled in the art to make and use our invention, we will describe its construction and operation, referring to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of a continuous mill illustrating our invention, and Fig. 2 is a perspective view of our improved guide or conductor.

Like letters of reference indicate like parts in each.

In the drawings a series of horizontal rolls, *a*, are journaled or mounted in suitable housings in common line of draft or feed, thus forming the continuous mill *B*. The continuous mill may be formed of any number of sets or pairs of rolls, from two upward, according to the thickness of the billet fed to the mill, and the gage of the plate, strip, or hoop to be formed, the ordinary hoop-mill requiring from four to seven of these sets or pairs of rolls. The rolls shown are what are known as "tongue-and-groove rolls;" but any suitable form may be employed—such as groove and plain-face rolls, or plain-face rolls—as desired by the skilled operator and required by the class of metal to be rolled. The housings *c* of the rolls are bolted to a bed-plate, or secured by other means to suitable foundations, being mounted in line and at such distances apart as are desired by the skilled operator, this being determined, to some extent, by the length of the pile or billet employed, and the plate, strip, or hoop formed therefrom.

The rolls are preferably geared to run at about the same surface speed, it not being necessary that they should be geared to run at different speeds according to the reduction and lengthening of the metal, as the metal may buckle within the conductors, as hereinafter set forth. In rolling long strips, however, it may be desired to gear the rolls at or near the end of the continuous mill to run at a higher rate of speed than the rolls at the entering end, though this is not necessary to the successful operation of our continuous mill. Supported



on suitable cross-bars, *d*, on the housings between each set of rolls is the guide or conductor *e*, the guide being formed of a bottom plate, *f*, and the side walls, *g*. The bottom plate is made slightly wider at the receiving end than the pass in the rolls which deliver the strip or plate into it, and is arranged to guide the strip or plate into the next set or pair of rolls at the delivery end of the conductor. The walls *g* of the conductor extend up perpendicularly for a considerable height on either side of the base-plate *f*, the walls being generally about three feet high, and extending up to or above the tops of the upper rolls in each set. The space between the walls is slightly larger than the strip or plate to be fed through the conductor, so that the strip or plate is not liable to catch within the conductor as it is fed through the same. The walls are, however, arranged to fit close enough to the strip guided through that when the strip buckles or bends within the conductor it shall be prevented from falling to either side by the high walls thereof, and that any buckling or bending of the strip shall be regular within the conductor, and after the piece has been delivered therefrom it will feed regularly through the pass of the next set of rolls.

In order to prevent the metal fed through the conductor from coming in contact with the upper roll at the delivery end thereof at any point except in the pass between the rolls, we place near the delivery end one or more idle-rolls, *h*, and as the metal buckles or bends in the conductors it will come against the idle-rolls and be held from contact with the roll, and will then gradually feed into the pass between the rolls. The guide or conductor is preferably made with an open top, so that in case the metal should buckle or bend to a great extent it may rise beyond the top of the walls thereof, there being no liability of its jamming in the conductor on account of its being confined therein by such cover or top, though, where the rolls are geared to run at different surface speeds and the buckling within the conductor is not great, the top may be closed, if so desired. At the entrance of the conductor, and within the same, the usual stripper, *k*, for stripping the plates from the rolls is employed.

In rolling the metal in our improved continuous mill, a heated billet or pile is fed to the first set of rolls and passes through them, being reduced and elongated by them, and fed from them through the conductor *e* to the next set of rolls, the metal being stripped from the first set of rolls by the stripper *k*, and then passing along the bottom of the conductor and feeding automatically into the next set of rolls. As the metal is elongated in the first set and continues to be operated upon by that set after feeding to the next set of rolls, it buckles or bends up within the conductor, the bending of the metal being in regular curves,

as it is prevented from falling over by the sides of the conductor. As soon as it passes entirely through the first set of rolls it gradually feeds into the next set of rolls, and as soon as the extra metal within the trough is taken up by this set it falls down within the conductor and feeds to the next set of rolls in the usual manner. It passes on in this manner through the entire sets of rolls in the continuous mill, and as the plate, strip, or hoop is greatly elongated the bending or buckling within the conductors increases; but as the walls of the conductor hold the metal so that its bending or buckling is in regular curves, and the space in the conductor is too narrow to allow one bend or buckle to pass beyond the other, there is no liability of the hoop jamming or knotting within the conductor, and it thus is fed through the mill, bending and buckling and again straightened out between each pass thereof. In case the bending or buckling extends to the delivery end of the conductor, it is prevented from coming in contact with the upper part of the upper roll by the idle-rolls *h*, supported by the side walls, *g*. The mill is thus arranged so that the metal can be automatically fed through from one set or pass of rolls to the next, and can buckle or bend up within the conductors, being held therein in such a way that there is no liability of its jamming or knotting, and gradually feeding through each pass of the mill without relation to the speeds of the other passes; and by this simple conductor we are enabled to form a continuous mill which occupies but little space, and which does not require the intricate and expensive gearing necessary where the rolls are geared or arranged to run at different speeds, according to the elongation of the metal. On account of the open top of the conductors, if the plate, strip, or hoop should jam therein on account of not feeding properly into the next pass of the continuous mill, it can be easily removed therefrom without in any way disturbing the apparatus.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In continuous mills for rolling metal, the combination, with a series of two or more pairs of horizontal rolls arranged in common line of feed, of the guides or conductors between the rolls, where said guides or conductors are provided with high walls or sides to permit the metal passing through to buckle or bend up within the conductors, substantially as set forth.

2. In continuous mills for rolling metal, the combination, with a series of two or more pairs of horizontal rolls arranged in common line of feeding, of the guides or conductors between the rolls, having high walls or sides to permit the metal passing through to buckle or bend within the conductors, and strippers within said conductors to strip the metal



from the rolls at the entering end of the conductors thereof, substantially as set forth.

3. A guide or conductor for continuous mills, having high walls or sides to permit the  
5 metal passing through to buckle or bend within the same, and one or more idle-rolls at the delivery end thereof, substantially as and for the purposes set forth.

In testimony whereof we, the said GEORGE

W. COBBETT and JOHN E. CUNNINGHAM, have to hereunto set our hands.

GEORGE W. <sup>his</sup> X COBBETT.  
mark.  
JOHN E. CUNNINGHAM.

Witnesses:

J. N. COOKE,  
JAMES I. KAY.