(No Model.)

W. H. GRAHAM.

ROLL FOR ROLLING I-BEAMS INTO PLATES.

No. 341,570. Patented May 11, 1886.

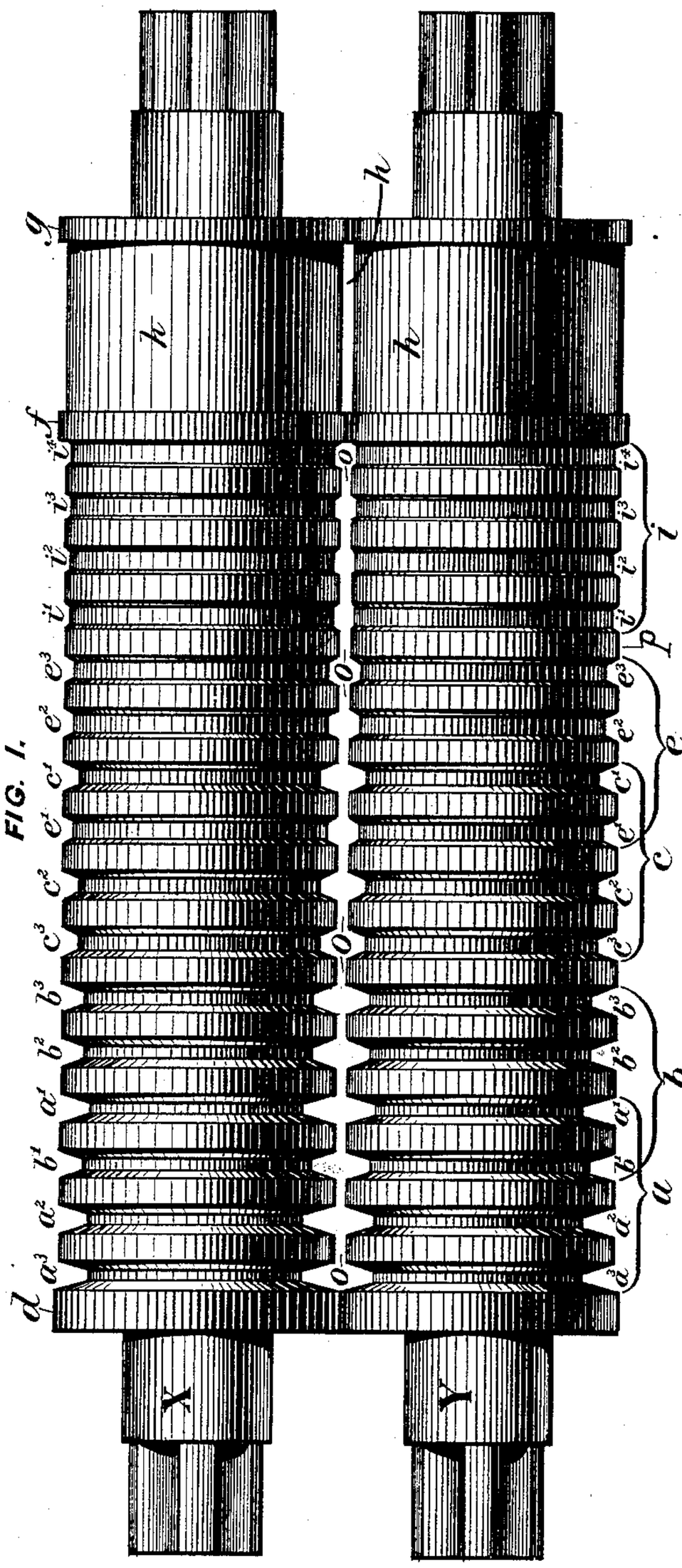

FIG. 1.

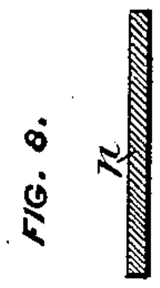

FIG. 8.

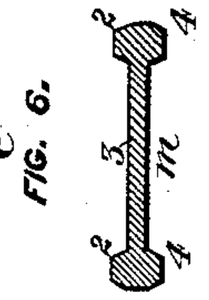

FIG. 6.

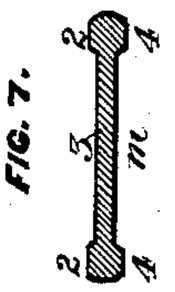

FIG. 7.

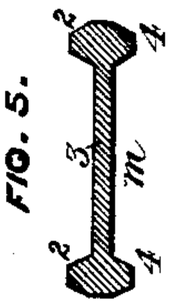

FIG. 5.

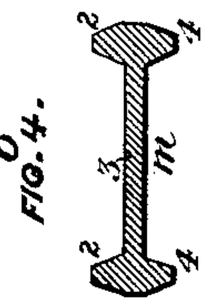

FIG. 4.

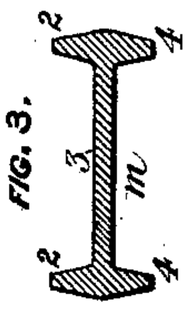

FIG. 3.

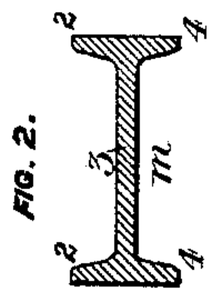

FIG. 2.

—INVENTOR—

William H. Graham

By Bakewell & Kerr

—ATTORNEYS—

—WITNESSES—

Harry L. Gill

W. D. Corwin

UNITED STATES PATENT OFFICE.

WILLIAM H. GRAHAM, OF PITTSBURG, ASSIGNOR OF TWO-THIRDS TO HAY WALKER, JR., TRUSTEE, OF ALLEGHENY, AND A. C. MILLIKEN, OF MILLVALE BOROUGH, PENNSYLVANIA.

ROLLS FOR ROLLING I-BEAMS INTO PLATES.

SPECIFICATION forming part of Letters Patent No. 341,570, dated May 11, 1886.

Application filed January 18, 1886. Serial No. 188,840. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. GRAHAM, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Rolls for Rolling **I**-Beams Down into Plates; and I do hereby declare the following to be a full, clear, and exact description thereof.

The object of my invention is to roll down the butts and ends of steel **I**-beams into flat plates suitable for use as nail-plates and for other purposes. These butts and ends are formed in considerable quantities by sawing off the defective ends of the beams, and being large and heavy efforts are made to utilize them, in order to reduce their loss as scrap and save the necessity of remelting them. They have heretofore usually been slit longitudinally to separate the web and flanges, thereby forming flat bars which were easily rolled to shape. The necessity for cutting off the flanges arose from the fact that they would not weld if rolled down on the web, and consequently produced a seam or defective place in the resultant product, which rendered it worthless for most purposes.

My invention consists of an improved construction of rolls, whereby I am enabled to roll down such beams into flat plates without plication or seam.

To enable others skilled in the art to make and use my invention, I will now describe it by reference to the accompanying drawings, in which—

Figure 1 is an elevation of a pair of rolls embodying my invention. Fig. 2 is a cross-section of an **I**-beam. Figs. 3, 4, 5, 6, and 7 are cross-sections of the same beam after passing through the grooved passes of the rolls. Fig. 8 is a view of the finished plate.

Like symbols of reference indicate like parts in each.

The rolls X Y are provided with a series of reducing-grooves having flat bottom and flaring sides, which grooves are grouped so as to constitute several different passes. Thus the first pass, *a*, is formed of the reducing-grooves *a' a³*, connected by an intermediate opening, *o*, which opening is of sufficient thickness to allow the free passage of the web 3 of the **I**-beam. The pass *b* is in like manner composed of flange-reducing grooves *b' b³*, also connected by the intermediate opening, *o*. In this instance the passes *a* and *b* overlap each other, the initial groove *b'* being arranged inside of the initial groove *a'* of the pass *a*. The purpose of this arrangement is to save cost in the construction of the rolls, as a portion of the room occupied by the first pass, *a*, is utilized in forming the second pass, *b*. The third and fourth passes, *c* and *e*, overlap in like manner, while the fifth pass, *i*, is separate.

Where the passes are entirely independent, as in the case with *e* and *i*, the intermediate connecting opening between the passes may, if desired, be closed by making the intermediate collars, *p*, of sufficient size for that purpose. I prefer, however, to leave them open, because there is a certain amount of lateral extension of the plate obtained by the free lateral spread of the metal in the connecting-opening *o*.

As before stated, the blanks shown in Figs. 4 to 7 indicate the shape of the beam communicated thereto by the respective passes *a*, *b*, *c*, *e*, and *i*. The flange-reducing grooves being made with flat bottoms and flaring sides, cause the flanges 2 2 and 4 4 of the beam *m* to be gradually reduced until they approximate to the thickness of the web 3 without folding or plicating them upon the web, so that no seam or defect is produced by the reduction.

Separated from the grooved pair of rolls by collars *f* is a plain or finishing pass, *h*, through which the beam, when in the condition shown in Fig. 7, is passed to bring it to a plate, *n*, Fig. 8, of uniform diameter, the thickness of said plate *n* being practically equal to the thickness of the flange 3 of the blank *m*. The connecting-opening *o*, which extends between the grooves of the various passes, permits the free passage of the web 3 without reducing or drawing the same, so that the reducing effect of the rolls is exerted upon the flanges alone until they are brought down to a uniform gage with the web 3. Of course the resultant plate *n* may be rolled out to a smaller gage by subsequent operation, if desired.

In connection with each pass *a*, *b*, *c*, and *e*, I show an additional groove, a^2, b^2, c^2, and e^2 in each roll, said additional grooves being connected by the opening *o* with the other grooves of the same size, the purpose of which is to enable me to reduce an **I**-beam of less width

than can be done in the grooves a' and a^3. When reducing such a beam, the grooves a' will be coupled with the grooves a^2. The I-beam m (shown in Fig. 2) is of the proper size to be reduced by the grooves a' and a^3, the grooves a' and a^2 being adapted for a narrower beam. In the pass i, four similar grooves are shown.

It is apparent that the rolls may be adapted in this way without unnecessary loss of space to use in the reduction of several different widths of beams.

I do not limit myself to any given number of passes in a single pair of rolls, although I prefer the construction illustrated in the drawings, because it is apparent that each pass may be arranged in a separate pair of rolls.

My invention is in practical operation and proves to be of great practical and economic merit. It enables me to utilize the whole mass of metal in the I-beam without shearing, which results in the production of a larger plate without increasing the cost, and one which, by reason of its increased size, is adapted to more extended uses.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A pair of rolls for rolling I-beams down into plates, each provided with a series of reducing-grooves having flat bottoms and flaring sides arranged opposite each other, with an intermediate opening which permits the free passage of the web of the beam, said grooves being grouped in pairs, so that each two pairs constitute a separate pass, and the grooves of each pass being deeper than those of the succeeding pass, while the intermediate opening remains the same throughout all the passes, substantially as and for the purposes described.

2. In a pair of rolls for rolling I-beams down into plates, in which the pass is composed of a pair of flange-reducing grooves having flat bottoms and flaring sides in each roll connected by an intermediate opening, which permits the free passage of the web of the beam, the combination of the first pair of the opposite grooves with a third pair of like opposite grooves arranged beyond the second pair and connected with the first pair by an intermediate web-passage, substantially as and for the purposes described.

3. A pair of rolls for rolling I-beams down into plates provided with several passes, each composed of flange-reducing grooves having flat bottoms and flaring sides connected by an intermediate opening for the free passage of the web, the passes being of gradually-diminishing depth, in combination with a plain finishing-pass arranged at the end of the rolls, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 8th day of January, A. D. 1886.

WILLIAM H. GRAHAM.

Witnesses:
W. B. CORWIN,
THOMAS B. KERR.