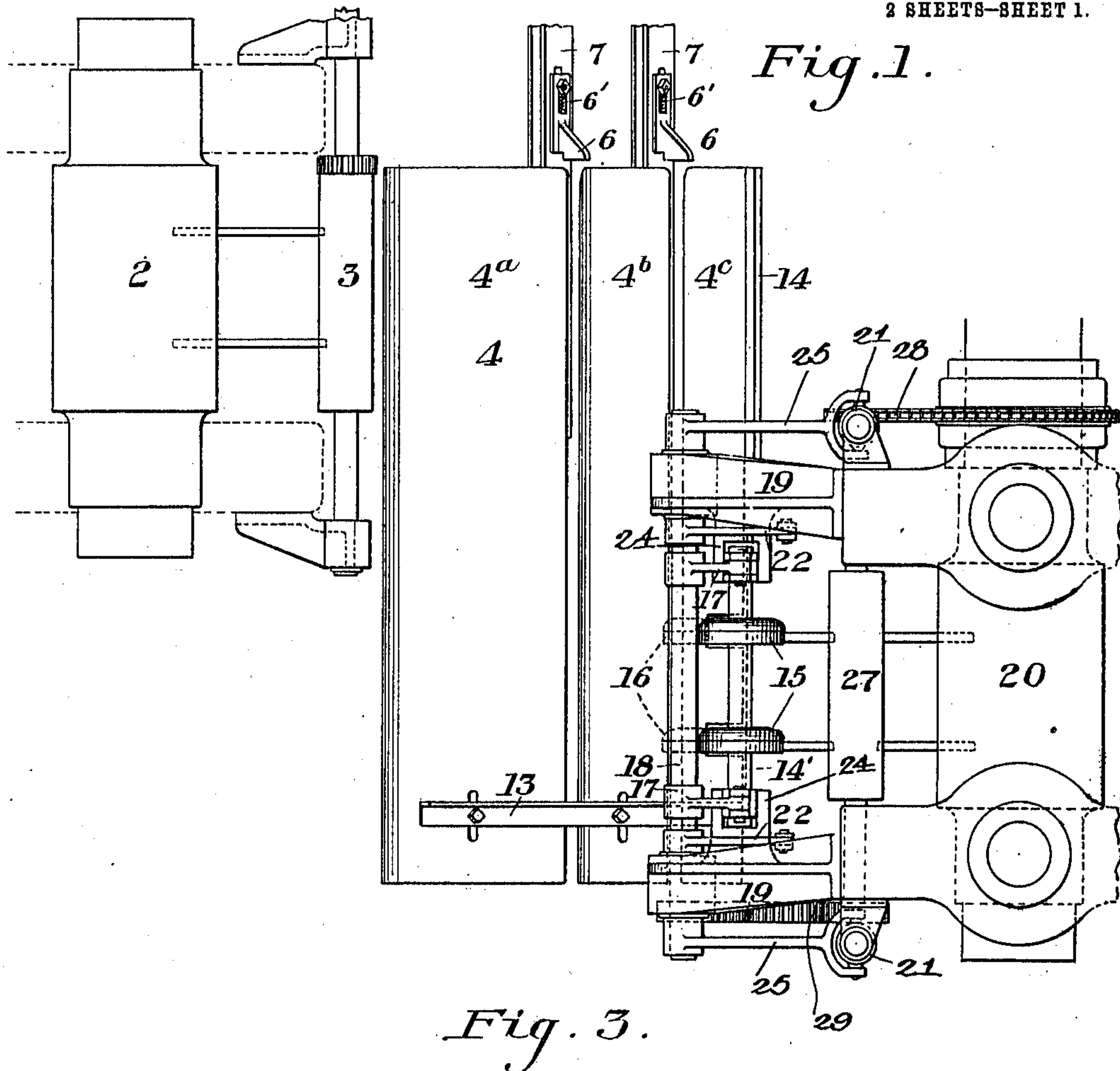


C. W. BRAY.  
 APPARATUS FOR ROLLING METAL SHEETS.  
 APPLICATION FILED NOV. 7, 1905.

978,551.

Patented Dec. 13, 1910.

2 SHEETS—SHEET 1.



WITNESSES  
*George H. Somers,*  
*Frederick H. Davis,*

INVENTOR  
*C. W. Bray*  
*by Baker & Byrnes*  
*his attys*

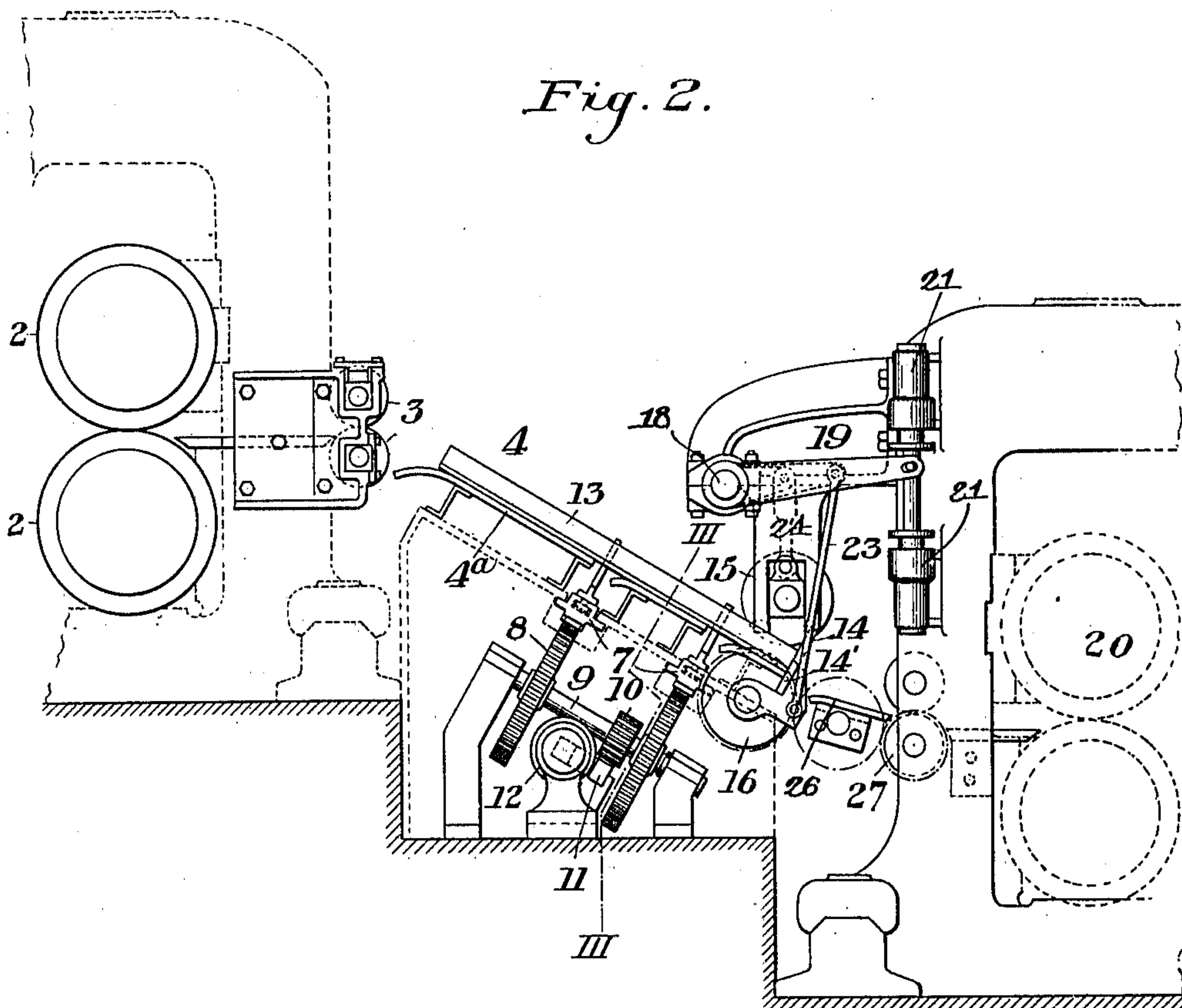
C. W. BRAY.  
 APPARATUS FOR ROLLING METAL SHEETS.  
 APPLICATION FILED NOV. 7, 1905.

978,551.

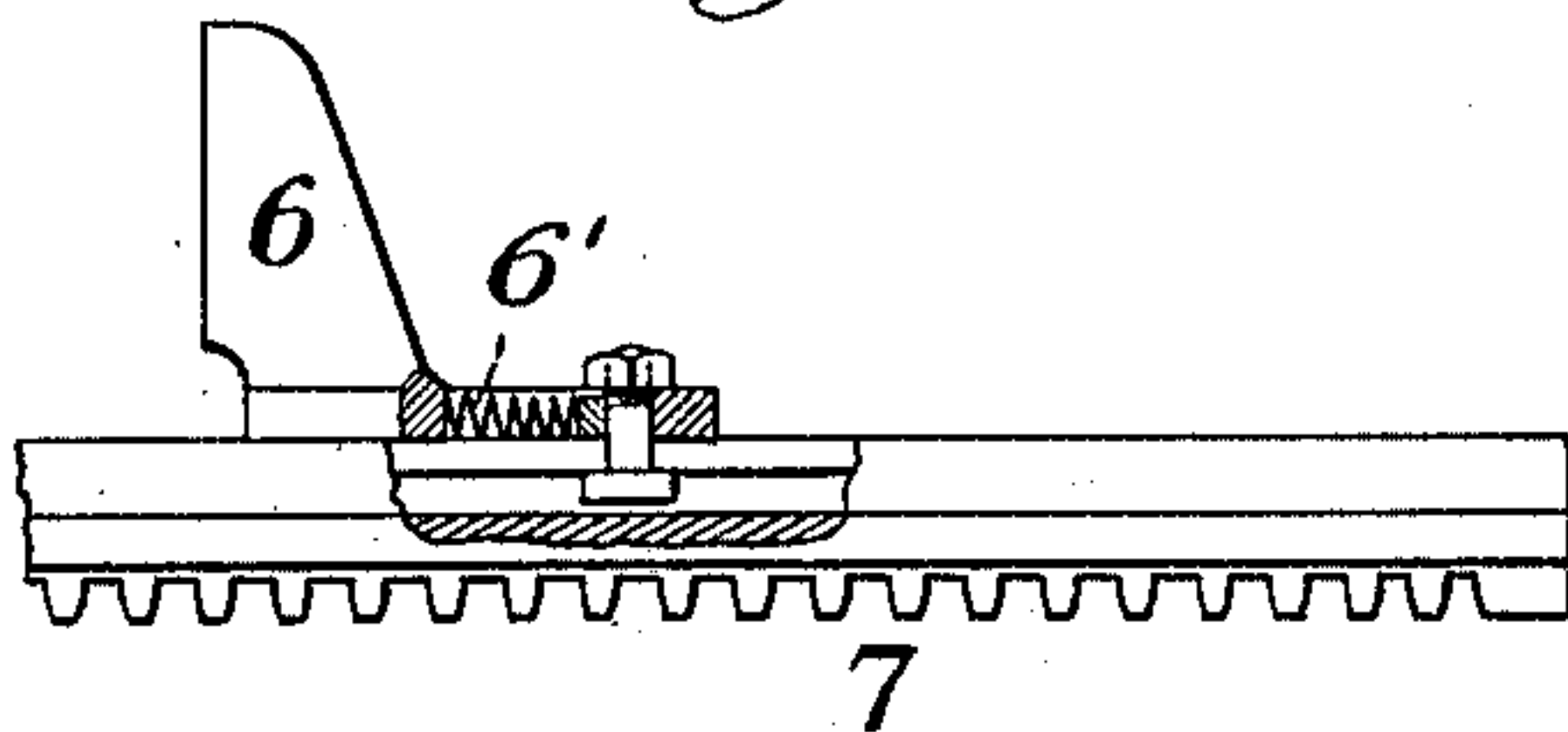
Patented Dec. 13, 1910.

2 SHEETS—SHEET 2.

*Fig. 2.*



*Fig. 4.*



WITNESSES

George H. Souneborn,  
 Frederick H. Davis

INVENTOR

C. W. Bray  
 by Baker & Byrnes  
 his attys



# UNITED STATES PATENT OFFICE.

CHARLES W. BRAY, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE AMERICAN SHEET & TIN PLATE COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

## APPARATUS FOR ROLLING METAL SHEETS.

978,551.

Specification of Letters Patent. Patented Dec. 13, 1910.

Application filed November 7, 1905. Serial No. 286,199.

*To all whom it may concern:*

Be it known that I, CHARLES W. BRAY, of Pittsburgh, Allegheny county, Pennsylvania, have invented a new and useful Apparatus for Rolling Metal Sheets, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

10 Figure 1 is a top plan view showing a portion of a mill constructed in accordance with my invention; Fig. 2 is a side elevation of the same; Fig. 3 is a cross-section on the line 3—3 of Fig. 2, looking toward the left; 15 and Fig. 4 is a detail view of one of the pushers or squaring-up devices.

My invention relates to the rolling of black plates or sheets, and is especially suitable for tandem mills, though it may be 20 used in other types of mills.

The object of the invention is to provide a matching device and mechanism by which the sheets or plates of the pack are moved sidewise bodily out of the line in which they 25 were fed into the matcher; also to provide means for feeding the matched pack forwardly out of the matcher in another line than that through which the plates entered the matcher.

30 The invention is also designed to provide for simultaneously squaring up the side edges of the pack and moving the pack sidewise preparatory to feeding forward in another line.

35 The invention further consists in means for squaring up the pack in both directions and moving it sidewise out of the line of feed into the matcher; and also in the construction and arrangement of parts as hereinafter more fully described and claimed. 40

In the drawings 2, 2 represent the rolls of the last set of a tandem mill which may have any desired number of sets of rolls, arranged in series. The means for feeding 45 the bars or plates into the first mill of the series and forward through the successive mills of the series may be of any desired type. In front of the exit-pass of this last set of rolls 2, I preferably employ pinch-

rolls, 3, 3, which are geared together and 50 may be driven through any suitable connections. The sheets pass singly and successively through the pinch-rolls, which are preferably mounted on the housing of the last tandem mill, and drop down upon the 55 inclined table 4 of the matcher. This table is preferably made in transverse sections, of which I have shown three: 4<sup>a</sup>, 4<sup>b</sup> and 4<sup>c</sup>. These sections are suitably supported on standards 5, which are arranged to allow 60 the passage of the pushers or movable squaring-up devices 6. These pushers 6, of which any desired number may be employed, movable in slots in the matching-table, are adjustably secured by bolts to reciprocating 65 rack-bars 7, which intermesh with toothed wheels 8 secured to a shaft 9. The shaft 9 is provided with a pinion 10, intermeshing with a rack 11, secured to the piston rod of a double hydraulic cylinder device 12 by 70 which the pusher-dogs may be actuated simultaneously in either direction.

In order to avoid injuring the edges of the sheets or plates of the pack, as they are pushed sidewise, I preferably support the 75 pushers loosely in guideways in the racks 7, each having a cushioning spring 6'. The pushers therefore may yield slightly as they strike the edge of the pack. At the side of the table opposite to the reciprocating 80 pushers, I provide a squaring up device 13 of any desirable form. I have shown it as adjustably bolted to the inclined matching table. At the front and lower end of the table is a squaring up stop 14 which preferably extends about one-half the length of 85 the table, as shown. As a continuation thereof I have shown a movable stop 14' secured to rock arms mounted loosely on the shaft of a pinch roller. The movement 90 of the stop 14' is obtained through links 23 which are connected to arms 22, projecting from a rock shaft 18. The rock shaft is mounted in brackets projecting from the housing of the succeeding reducing-rolls 20. 95

In order to feed out the matched-up pack and carry it forward into the rolls 20, which are out of alinement with the rolls 2, I pref-



erably employ a pinch-roll system. The lower roll 16 I have shown as mounted in stationary bearings, the roll being in the form of two separated disks. These disks are preferably rounded or beveled on the side toward the reciprocating pushers, thus allowing the lower rolls to project slightly above the face of the table without acting as a stop to prevent the proper sidewise movement of the pack on the table. If the lower roller is moved toward and from the upper pinch-roll 15, then the disks may be of ordinary form. The upper roller 15 also consists of separated disks, which I have shown as rounded or beveled on one side, and secured on a shaft carried by links depending from arms 17, and which are also secured to the shaft 18. The rocking of the shaft 18 will move the pinch-roll 15 toward or from its companion roller, its movement being guided by end-guides 24 which depend from brackets 19.

The rocking movement of the shaft 18 may be obtained in any desirable way. I have shown arms 25, which are loosely connected with suitable cylinders 21 mounted on the housing of the roll 20. The pinch-rolls feed the pack over a plate 26 to feeding-rollers 27, by which it is fed forward into the reducing-rollers 20. The rollers 20 may either be a single set or may be the first set of a tandem mill having two or more sets in series and in line with each other. The rollers 27 may be driven in any suitable manner, as by sprocket-chain connection 28 from the coupling-box of one of the rollers 20. The lower pinch-roll 16 may be driven by gearing connections 29 from the roller 27, as shown in Fig. 1.

In the operation of the device, the plates or sheets feed forward through the rolls 2 and the pinch-rolls 3, and drop, one upon the other, on the matching-table. As the successive plates slide down this table, they strike against the front stop and are squared up longitudinally. When the desired number of sheets or plates is thus piled into a pack, the reciprocating side-dogs are actuated to force the pack sidewise out of the line of feed from the rolls 2 and against the stationary end-stop of the matching-table. The sheets are thus squared up sidewise at the same time that they are moved into another line of feed. Having thus matched the pack, the movable front stop is lowered, and at the same time the upper pinch-roll 15 is moved down so as to pinch the pack between it and the lower roll 16. These pinch-rolls then feed the matched pack forwardly out of the matcher, whence it passes into the next set of reducing rolls 20, which are in a different line of feed. As the rolls 20, are at some distance from the pinch-rolls 15 and 16, I preferably employ a positive feed

mechanism between, which I have shown as in the form of feeding-rolls 27.

The advantages of my invention result from providing an apparatus by which the pack is matched and also moved into a different line of feed; also from the simultaneous squaring-up of the side edges and moving the pack sidewise out of the ingoing line of feed. By moving the whole pack sidewise, one set of the side squaring-up devices may be stationary, as shown. The apparatus provides for a mill where succeeding rolls are not in line with the rolls leading to the matcher, while the matching is quickly and easily carried out at a low cost and without requiring reheating.

It will be noted that by having the pack sidewise out of the path of the incoming plates or sheets, the succeeding plates need not be delayed, but can be fed forward at once, since one-half of the matcher-table is cleared for their reception before the pack is actually fed out of the matcher.

The mechanisms for feeding in and piling the sheets and for squaring-up and for feeding out the pack may be varied, and many other variations may be made in the form and arrangement of the apparatus without departing from my invention.

I claim:

1. A matcher comprising a matching table, and pinch rolls to which the work piece is fed in the direction of the longitudinal axes of the rolls, the ends of the rolls facing the direction of feed being tapered, substantially as described.

2. A matcher comprising a matching table arranged to receive single sheets to form a pack, means for moving a pack laterally on the table, pinch rolls above and below the table and between which the pack is fed in the direction of the longitudinal axes of the rolls, and fixed and movable stops arranged in alinement with each other and against which the sheets move, the movable stop being disposed beyond the pinch rolls, substantially as described.

3. A matcher comprising a matching table to which the sheets are successively delivered to form a pack, means for moving the pack laterally of the table, and pinch rolls normally spaced during the moving of the pack and between which said pack is moved in the direction of the longitudinal axes of the rolls, substantially as described.

4. A matcher comprising a matching table to which the sheets are successively delivered to form a pack, pinch rolls, feed dogs for engaging the pack and moving the same to the pinch rolls in the longitudinal direction of said rolls, yieldable supports for said dogs, and means for actuating the dogs, substantially as described.

5. A matcher including a table, a feed-in

device at one side of the table, feeding-out  
rolls at the opposite side of the table and  
out of alinement with the feed-in device,  
means for moving the work on the table  
5 from the feed-in portion thereof in between  
the pinch rolls in the direction of the longi-  
tudinal axes thereof, a guide to direct the  
work in between the rolls, and means for  
moving the guide out of the feed-out path of

the work to permit of the latter passing out 10  
of the rolls, substantially as described.

In testimony whereof, I have hereunto set  
my hand.

CHARLES W. BRAY.

Witnesses:

A. McWHIRTER,  
G. C. KIMBALL.