

No. 756,473.

PATENTED APR. 5, 1904.

W. CLASPER.
MANUFACTURE OF SHEET IRON.

APPLICATION FILED JAN. 24, 1903.

NO MODEL.

4 SHEETS—SHEET 1.

Fig. 3

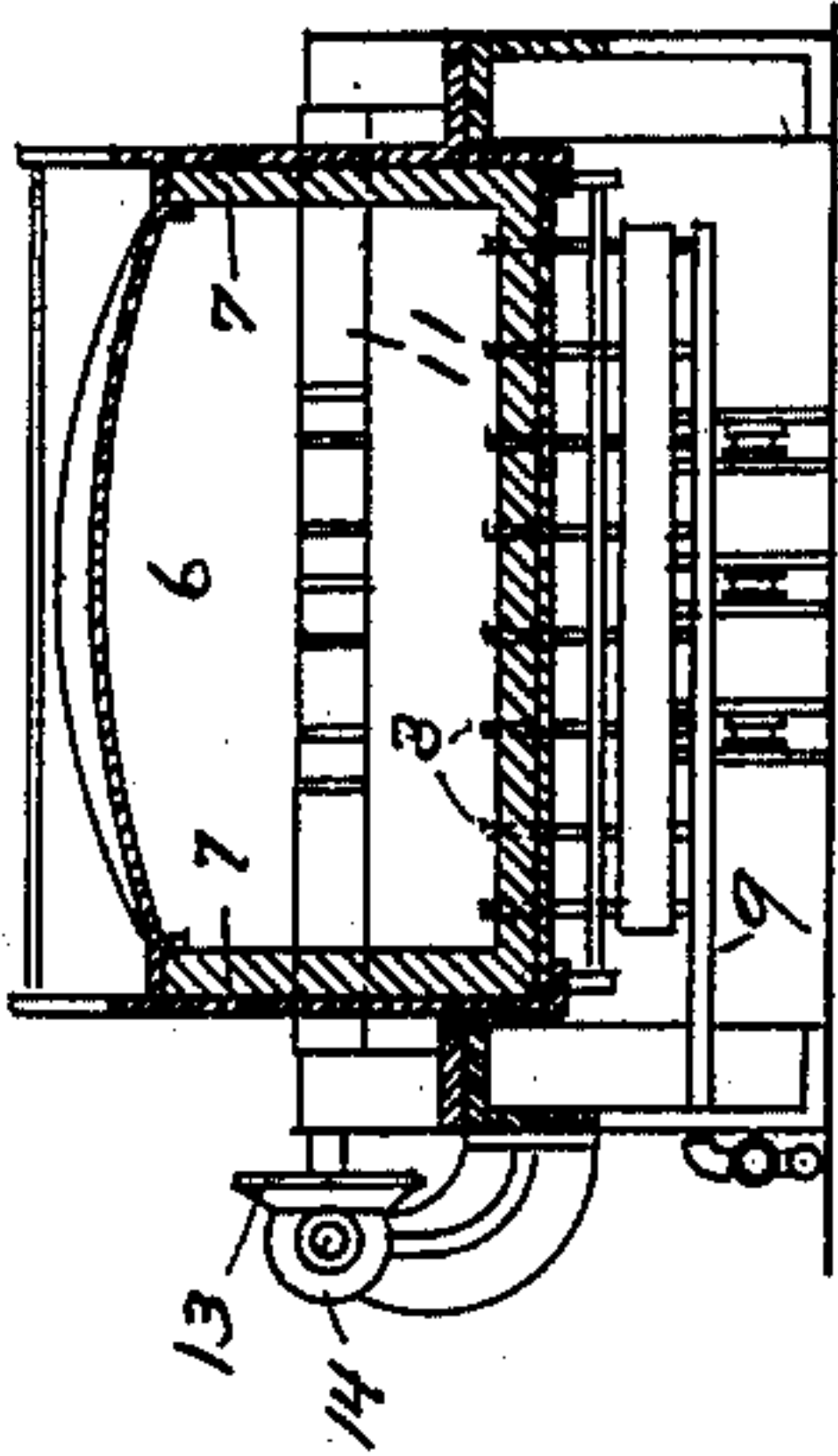


Fig. 1

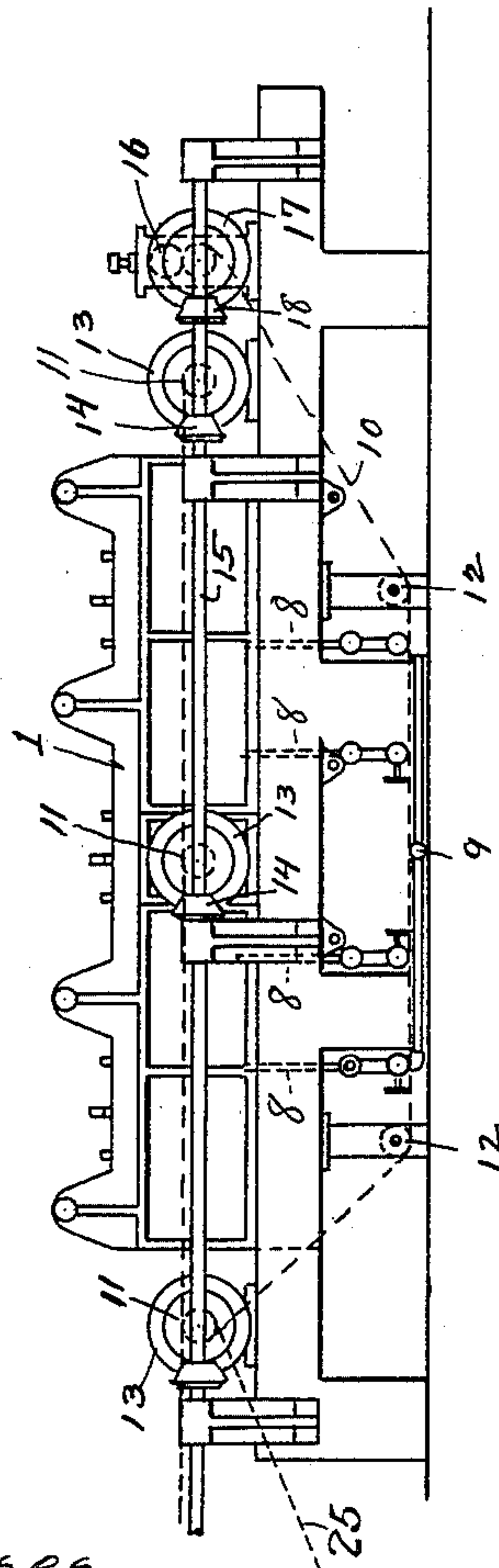
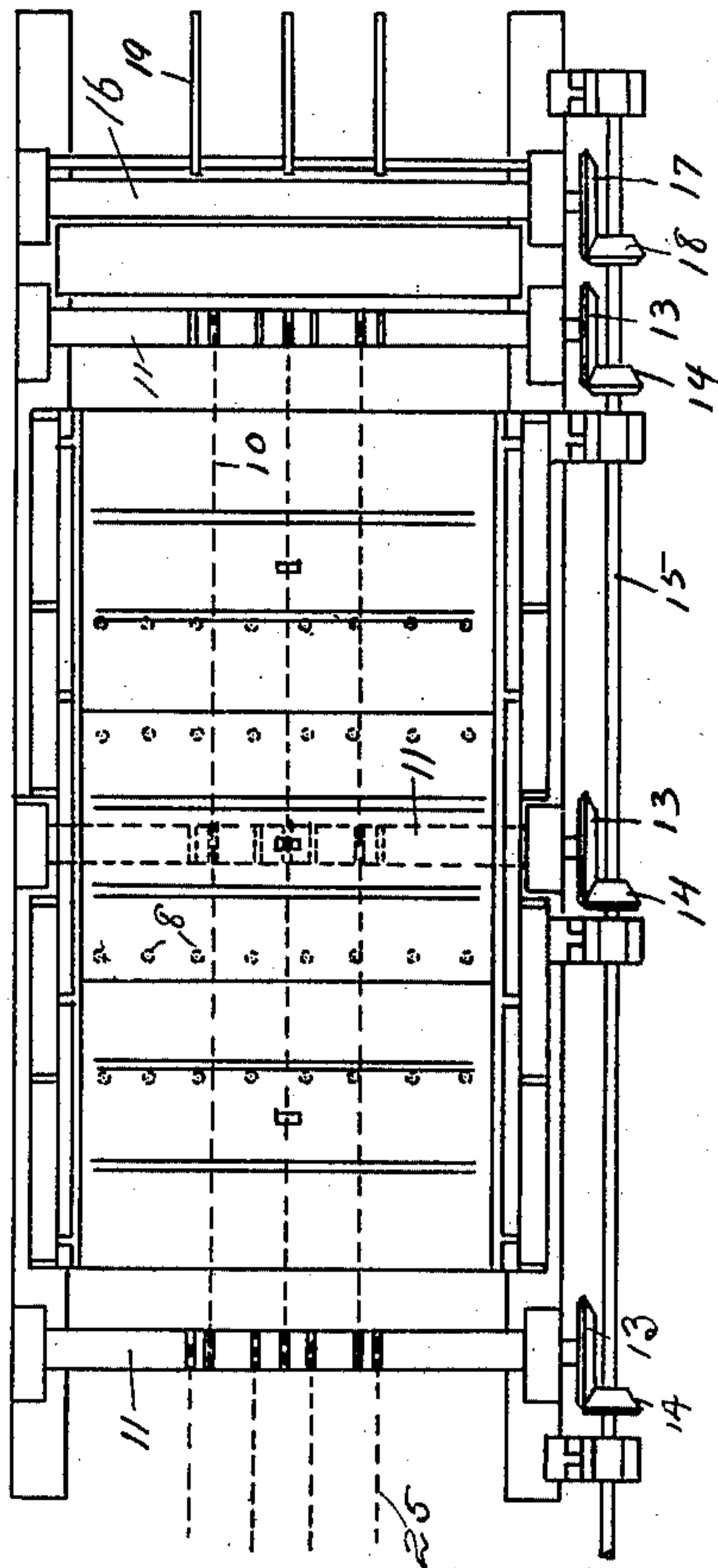


Fig. 2



Witnesses.

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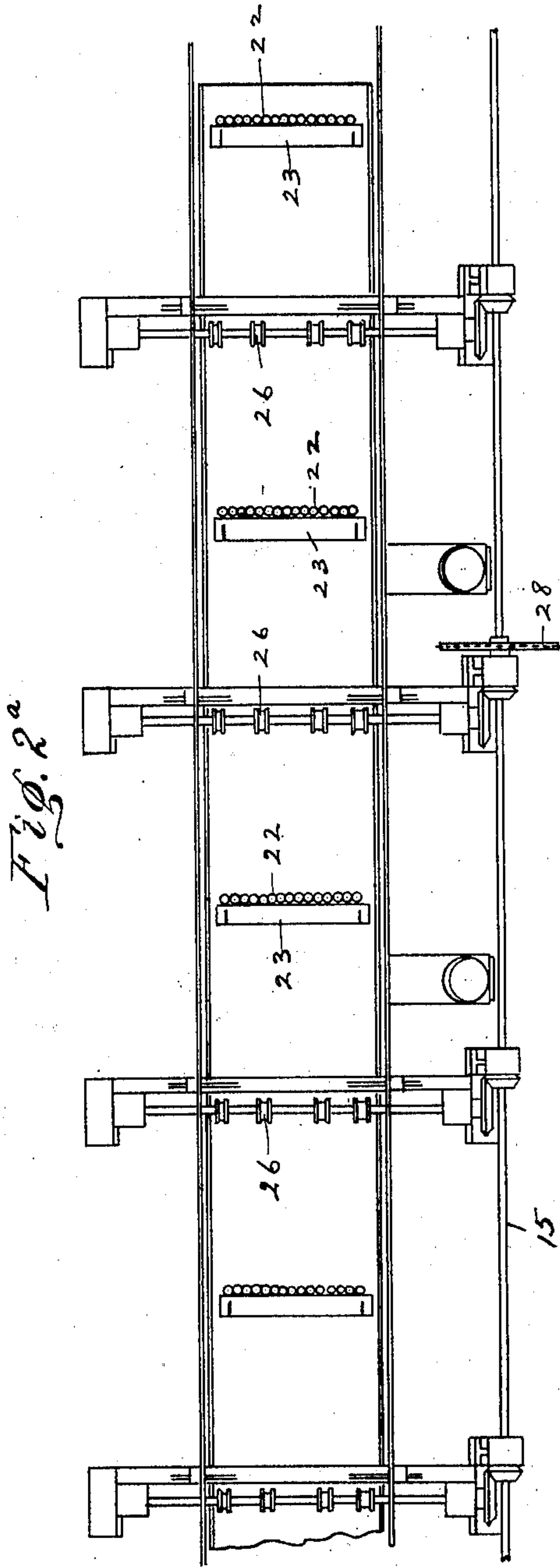
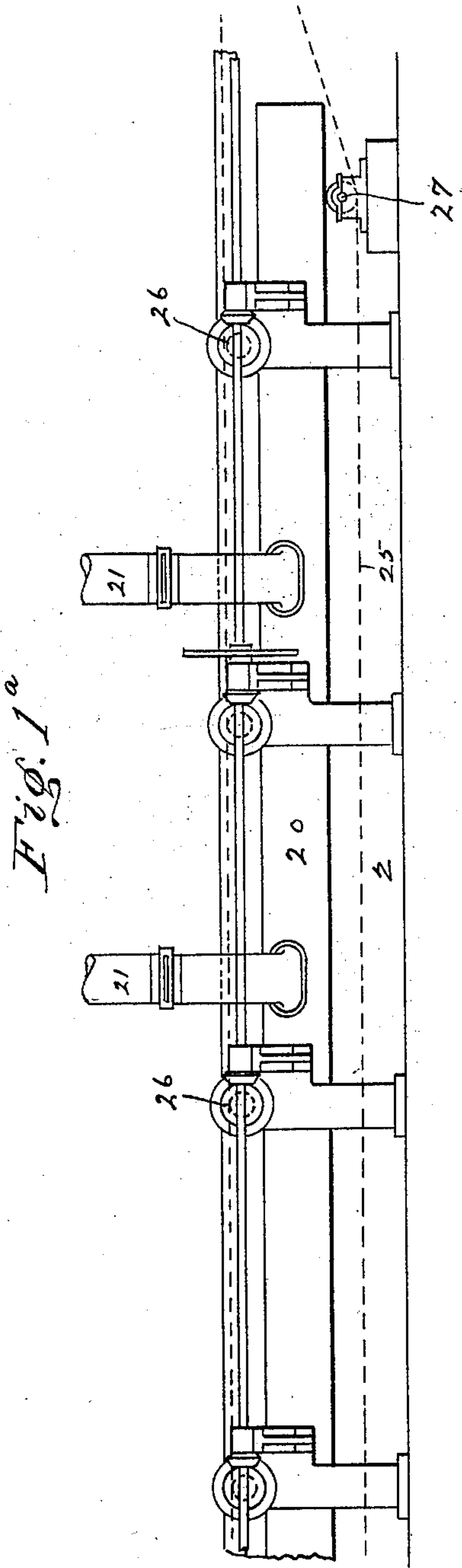
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4 SHEETS—SHEET 2.



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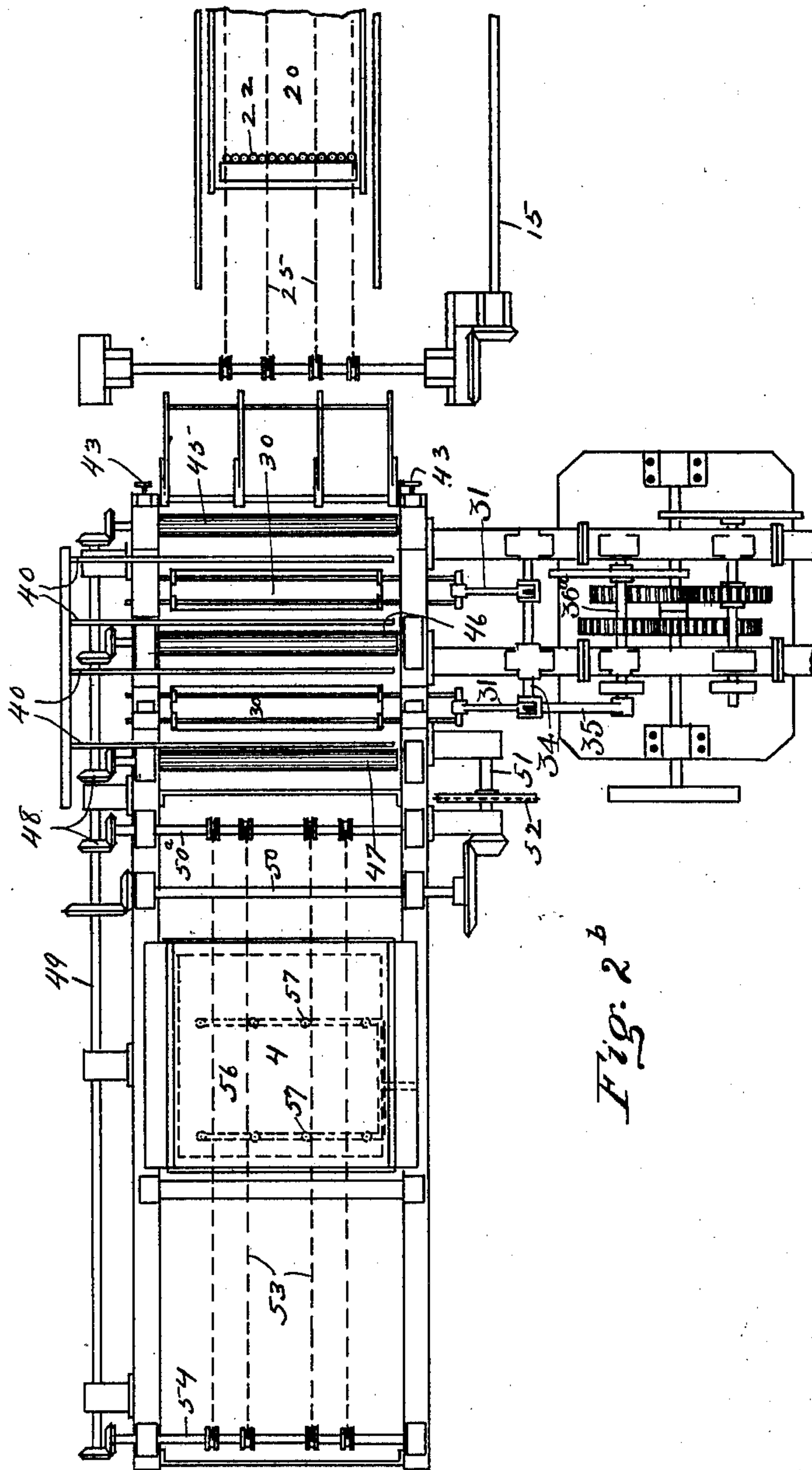
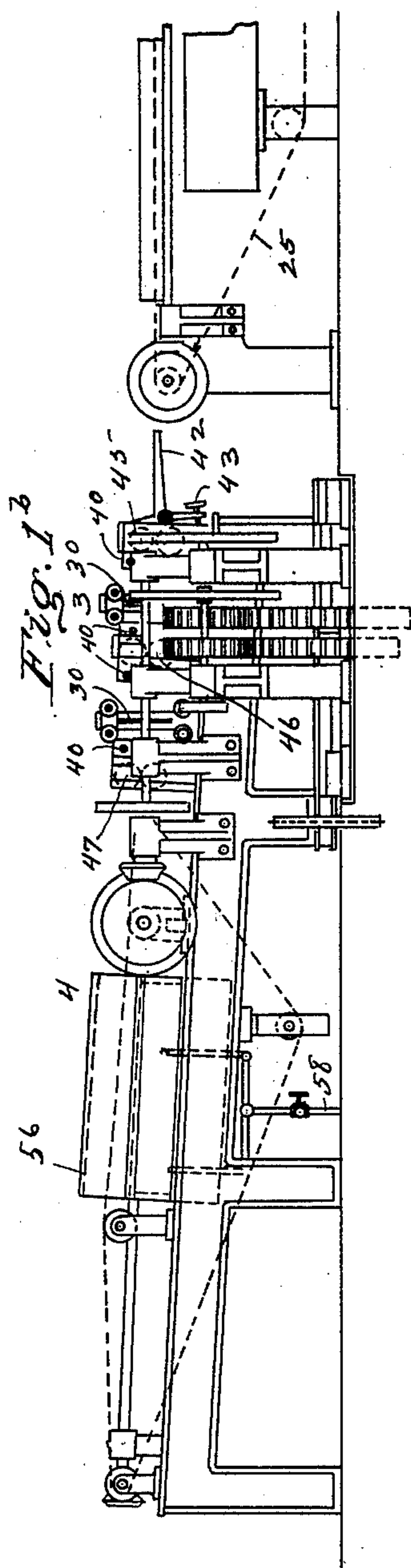
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4 SHEETS—SHEET 3.



Witnesses
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4 SHEETS—SHEET 4.

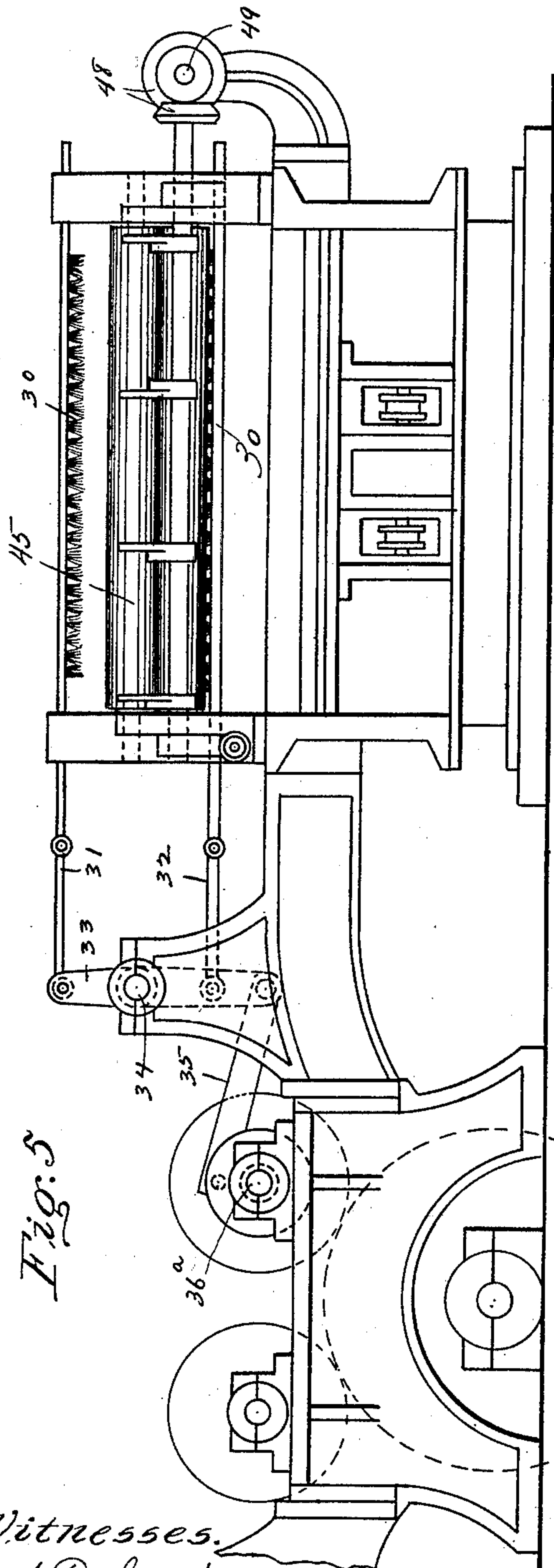


Fig. 3

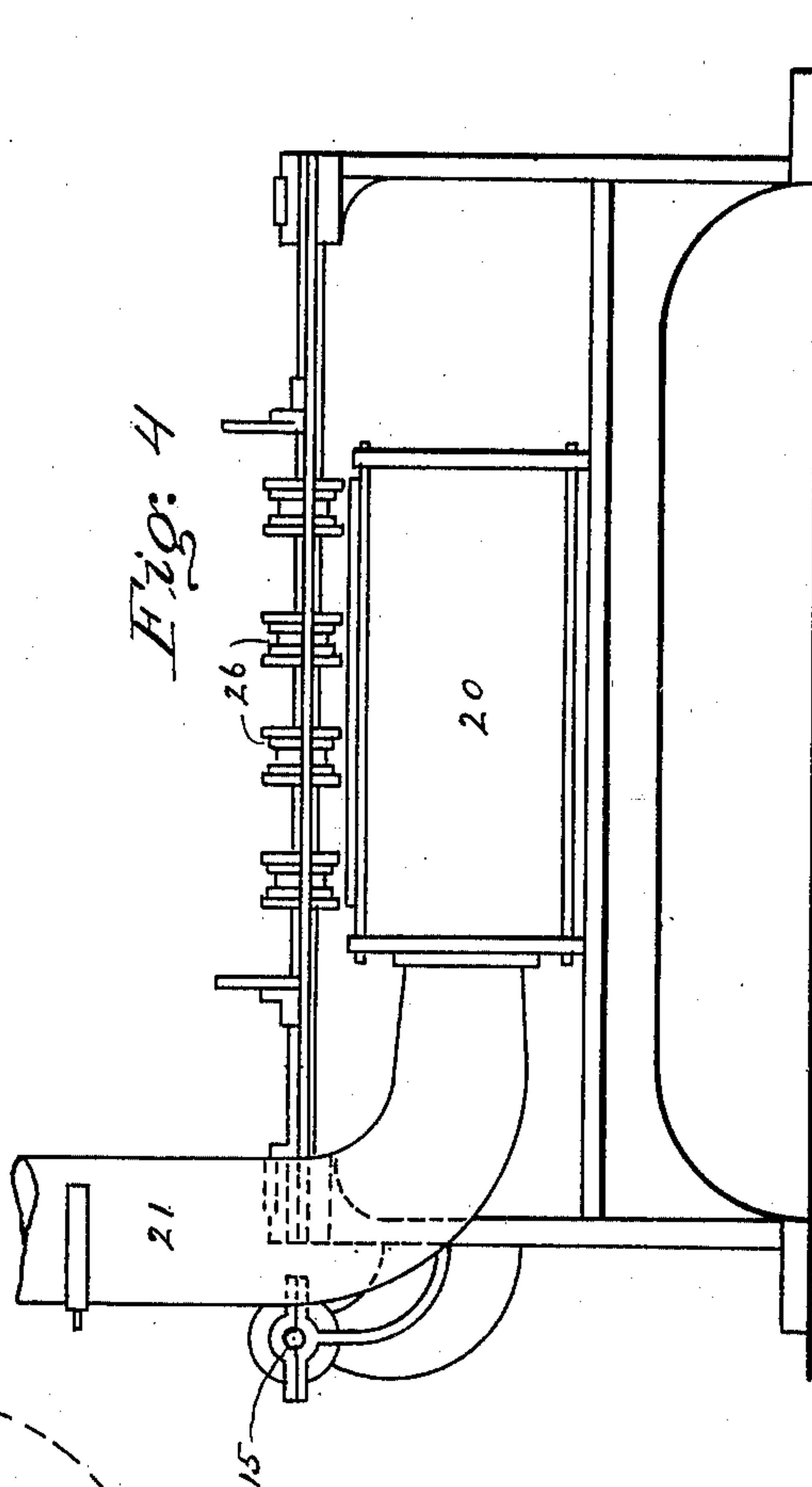


Fig. 4

Witnesses.
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UNITED STATES PATENT OFFICE.

WALTER CLASPER, OF McKEESPORT, PENNSYLVANIA.

MANUFACTURE OF SHEET-IRON.

SPECIFICATION forming part of Letters Patent No. 756,473, dated April 5, 1904.

Application filed January 24, 1903. Serial No. 140,331. (No model.)

To all whom it may concern:

Be it known that I, WALTER CLASPER, a resident of McKeesport, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in the Manufacture of Sheet-Iron; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to a method of making blued sheet-iron; and its object is to provide a method whereby blued sheet-iron of uniform color may be cheaply and expeditiously produced.

In the manufacture of sheet-iron the ordinary procedure followed is to roll the sheets down to the desired gage and then anneal the same in bulk by forming them in packs and placing them in suitable annealing boxes or muffles. The annealing produces a variety of colors in the sheets, some being much more highly colored than others and none of the sheets being uniform in color over their entire surface. This is due to the fact that the air in the annealing boxes or muffles cannot come in contact with all portions of the surfaces of all of the sheets, only creeping in at the edges of the sheets or between sheets which do not lie too closely in contact. To make blued sheet-iron, the sheets have heretofore been variously manipulated and subjected to various processes with a view of getting uniformity in color, one procedure being to take the sheets out of the annealing-boxes while still at a good red heat and exposing both surfaces thereof to the air to cool the same. This, however, is very slow and expensive and requires much labor and room and even at that does not give a uniform product. Various other procedures have been resorted to, but in all of them the results have not been absolute uniformity in color and such processes have been too slow and expensive for commercial purposes.

The object of my invention is to provide a method for producing blued sheet-iron whereby the same can be expeditiously and cheaply made and, nevertheless, whereby sheets of absolutely uniform color over their entire surfaces are produced and all of the sheets of any pack or batch are sure to be uniform in color.

To this end the invention consists in annealing the sheets in the ordinary way, preferably in bulk, and subsequently subjecting said annealed sheets singly to a mild diffused heat sufficient to raise them to a low cherry-red and in such a manner as to expose both surfaces of all of the sheets to exactly the same heat and atmospheric conditions and then cooling said sheets by means of an air-blast in order to produce uniformity of color.

In the accompanying drawings I have shown apparatus suitable for carrying out my method, and in said drawings—

Figure 1 is a side elevation of one end of the apparatus. Fig. 1^a is a similar view of the middle portion of the apparatus. Fig. 1^b is a similar view of the other end of the apparatus. Figs. 2, 2^a, and 2^b are plan views of corresponding portions of the apparatus. Fig. 3 is a transverse section through the bluing-furnace. Fig. 4 is a transverse section through the cooling-box, and Fig. 5 is an end view of the washing and scrubbing apparatus.

In carrying out my process the sheets will be reduced to the desired gage in the usual way and are then annealed in the usual way, but preferably in bulk in annealing boxes or muffles, as this is the quickest and cheapest annealing process in use. When the sheets come from the annealing box or furnace, they will be found to be of a variety of colors, and in order to produce uniformity of color and a uniform thin oxid coating thereon to give the necessary blue color said sheets are then again raised to a low cherry-red and again allowed to cool. In order to secure absolute uniformity of result, the heating and cooling is done by passing the sheets singly and processionally with both faces exposed through a furnace having a mild diffused heat therein and then exposing the same to an air-blast to cool the same. This may be done by means of any suitable apparatus, and in the accompanying drawings I have shown apparatus suitable for carrying out my method.

The apparatus shown comprises a bluing-furnace 1, a cooling-box 2, scrubbing and washing apparatus 3, a drying-box 4, and suitable conveying and feeding mechanisms for transferring the sheets progressively through the various parts of the apparatus.

The bluing-furnace comprises a furnace-chamber 6 of suitable height, width, and length to accommodate sheets of the desired dimensions and retain the same therein a sufficient length of time to properly heat the same. This furnace-chamber is shown as provided with a refractory lining 7 and is heated by means of gas-burners 8, projecting up through the bottom of the furnace. There are four rows of such burners shown, eight burners in each row, and they are connected by suitable pipes and valves to a gas-supply pipe 9. By means of these several rows of gas-burners a mild diffused heat can be created in said chamber, said heat being practically uniform in all parts of the chamber and not concentrated in any one point, so that the sheets when introduced in the chamber will not be subjected to a concentrated or excessive heat, which would neutralize the effect of the previous annealing. The temperature maintained in the furnace is such as to raise the sheets to a low cherry-red. The sheets are introduced into the furnace singly, so that both faces thereof are exposed to exactly the same heat and atmospheric conditions, thus insuring a uniform color over the entire surface of the sheet. The sheets may be introduced into the furnace in any suitable way or by any suitable mechanism; but in order to secure uniformity for all sheets it is desirable that the sheets remain in the furnace a uniform length of time, and as a consequence I prefer to use power-actuated mechanism for introducing the sheets into the furnace and removing them therefrom, and for convenience of operation this mechanism is so arranged as to feed the sheets in a procession into the furnace and progressively through and out of the same. Suitable means for accomplishing this result are shown in the drawings, wherein a series of carrying-chains 10 are shown extending through the furnace and back underneath the same, being supported and driven from suitable rollers 11, one at each end of the furnace and one in the furnace and being guided underneath the furnace by suitable guide-rollers 12. The rollers 11 are driven by any suitable mechanism, such as the bevel-gears 13 on their outer ends, which are engaged by bevel-pinions 14 on a power-shaft 15, mounted in suitable bearings and extending longitudinally of the apparatus and driven by any suitable mechanism. In advance of the first roller 11 are a pair of positively-driven feeding-rollers 16, mounted in suitable bearings, and one of which is provided with a bevel-gear 17, meshing with a bevel-pinion 18 on the shaft 15. In advance of these rollers is a table 19, formed of a series of bars, as shown in Fig. 2, and preferably hinged so that it can be swung up out of the way. The sheets to be blued are placed on this table and pushed singly into the feeding-rollers 16, which feed them onto the carrying-chains 10, by which they are carried in a procession through the

furnace, being heated therein to a low cherry-red.

When the sheets emerge from the furnace, they are carried at once and progressively to the cooling mechanism. This may be of various constructions, that shown in the drawings comprising a long box 20, having one or more blast-pipes 21 connected thereto, through which cold air is forced into said box. This box is practically rectangular in cross-section, having a flat upper face provided at intervals with rows of air-ports 22, through which the air is forced into contact with the sheets, which are carried over said box. Slides 23, provided with slots through which pass securing-bolts, are mounted adjacent to each row of ports 22, so that these ports may be uncovered more or less to regulate the amount of air flowing out of the same. The hot sheets coming from the bluing-furnace are carried in procession over this cooling-box and are subjected to blasts of cold air coming from the ports 22, so that the sheets are gradually, slowly, and uniformly cooled, thus producing a uniform thin coating of oxid over their entire surfaces. The sheets may be carried over this box by any suitable mechanism, and I have shown for this purpose a series of carrying-chains 25, passing over driving and supporting rollers 26, extending transversely across the top of the box, said chains passing back underneath the cooling-box, being guided by suitable rollers 27. The driving and supporting rollers 26 are driven by means of bevel-gearing from the shaft 15 exactly in the same manner as the guiding and supporting rollers 11 of the bluing-furnace are driven. This shaft 15 extends the full length of the bluing and cooling apparatus and may be driven in any manner—such, for instance, as a sprocket-chain connected to the sprocket-wheel 28. At the entrance end of the cooling-box the chains 25 pass over the same roller 11 that the chains 10 of the bluing-furnace pass over, this one roller being common to both sets of chains. The sheets after being cooled are immediately fed, and in a progressive manner, to the washing and scrubbing apparatus, which removes therefrom any dirt or other impurities adhering thereto. Any suitable washing and scrubbing apparatus may be employed, that shown in Figs. 1^b, 2^b, and 5 of the drawings being a well-known type of apparatus for this purpose. It comprises several sets of reciprocating brushes 30, two such sets being shown, each set consisting of a top and a bottom brush, one acting on the upper face of the sheet and the other on the lower face thereof. These brushes are reciprocated by any suitable mechanism and preferably so that the two brushes of each set move in opposite directions. A suitable means for this purpose comprises rods 31 and 32, connecting the top and bottom brushes, respectively, with opposite ends of a rocking lever 33, secured to a

rock-shaft 34. The latter is rocked by any suitable mechanism, such as the connecting-rod 35, attached at one end to an arm 36, secured to the rock-shaft, and at its opposite end to a crank on a power-shaft 36^a. This shaft is driven by any suitable mechanism from any suitable source of power.

By means of the mechanism described the sheets will be scrubbed on their top and bottom surfaces by brushes moving in opposite directions. During this process the sheets are sprayed with water both on their upper and lower faces, this spraying being done by means of suitable perforated water-pipes 40, four pairs of such pipes being shown, one of each pair being above and the other below the sheets. The spray-pipes are connected to any suitable water-main and provided with suitable regulating-valves.

The sheets are fed to and through the scrubbing apparatus by any suitable mechanism, and I have shown for this purpose a table 42, which receives the sheets from the carrying-chains 25. This table is preferably pivoted as shown so that it can be swung out of the way to allow the workmen to pass through and is composed of a series of bars, as shown in Fig. 2^b. It preferably is inclined so as to cause the sheets to slide forwardly down the same, and this inclination can be adjusted by means of the screws 43. (Shown in Fig. 1^b.) Adjacent to this table are a pair of driven feed-rollers 45, which feed the sheet forward and between the first pair of brushes. Between the two pairs of brushes is another pair of driven feed-rollers 46, preferably of gum or other elastic material, and beyond the second pair of brushes is a similar pair of rollers 47. These feed-rollers are driven by any suitable mechanism, such as bevel-gearing 48 from a shaft 49, which in turn is driven from a cross-shaft 50, driven from a counter-shaft 51, provided with a sprocket-wheel 52 or other suitable driving means. By means of the driven rollers described the sheets are fed through the scrubbing apparatus and supported while being washed and scrubbed.

The sheets are delivered by the last pair of driven rollers 47 to a series of conveyer-chains 53, which pass over suitable driving and supporting rollers, one set of which are on the driven shaft 50, adjacent to the feed-rollers 47, and the other on a shaft 54 at the outer end of the apparatus. These chains carry the cleaned wet sheets through a drying-box 56, this being a rectangular box of the necessary width, height, and length and open at its ends, so that the conveyer-chains can carry the sheets into and through the same. Into this drying-box project a series of gas-burners 57, two rows of four each of such burners being shown and being connected to a gas-pipe 58. Only a moderate temperature is maintained in this box—just sufficient to dry the sheets. The sheets emerge from the box in a perfectly dry

and clean condition and are removed in any suitable way.

In carrying out my method the sheets are annealed in bulk in the usual way, and then by means of the apparatus described the annealed sheets are first heated to a low cherry-red, this heating being done singly, so as to expose both faces of all of the sheets to the same atmospheric and heat conditions. A mild diffused heat is maintained in the furnace, so as not to detrimentally affect the annealed sheets, but sufficient to bring all of the sheets to a uniform color. The sheets are passed singly and in a progressive manner through this bluing-furnace and are then cooled by being passed singly and progressively over the cooling-box described, being there subjected to the blasts of cold air. These blasts are so arranged as to cool the sheets slowly, so as not to detrimentally affect them, but with sufficient rapidity to produce a uniform thin coating of oxid on the surfaces of said sheets. By the time the sheets reach the washing and scrubbing apparatus they are practically cold. They are then passed in the same single procession through the washing and scrubbing apparatus, being there sprayed with water and scrubbed to remove all dirt and other impurities and are then carried through the drying-box, emerging from the same in a perfectly clean and dry condition and having uniformly-colored surfaces of a slightly-bluish tint. The process as carried out by this apparatus is a progressive one from beginning to end and necessitates no manual handling of the sheets other than the feeding of them singly to the apparatus and transporting them away after passing through the apparatus.

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

1. The process of making blued sheet iron or steel, which consists in annealing the sheets, and subsequently raising the sheets separately to a low cherry-red heat by passing them singly and processionally and at the same rate of speed with both faces exposed through a furnace having a mild diffused heat therein, and then insuring the proper blued surface by exposing them to slow air-blast cooling.

2. The process of making blued sheet iron or steel, which consists in annealing the sheets in bulk, subsequently raising the sheets separately to a low cherry-red heat by passing them singly and processionally at the same rate of speed with both faces exposed through a furnace having a mild diffused heat, and then slowly cooling the same by passing them singly and processionally with both faces exposed over an air-blast.

In testimony whereof I, the said WALTER CLASPER, have hereunto set my hand.

WALTER CLASPER.

Witnesses:

G. M. COOPER,
G. W. RODGERS.