

No. 754,752.

PATENTED MAR. 15, 1904.

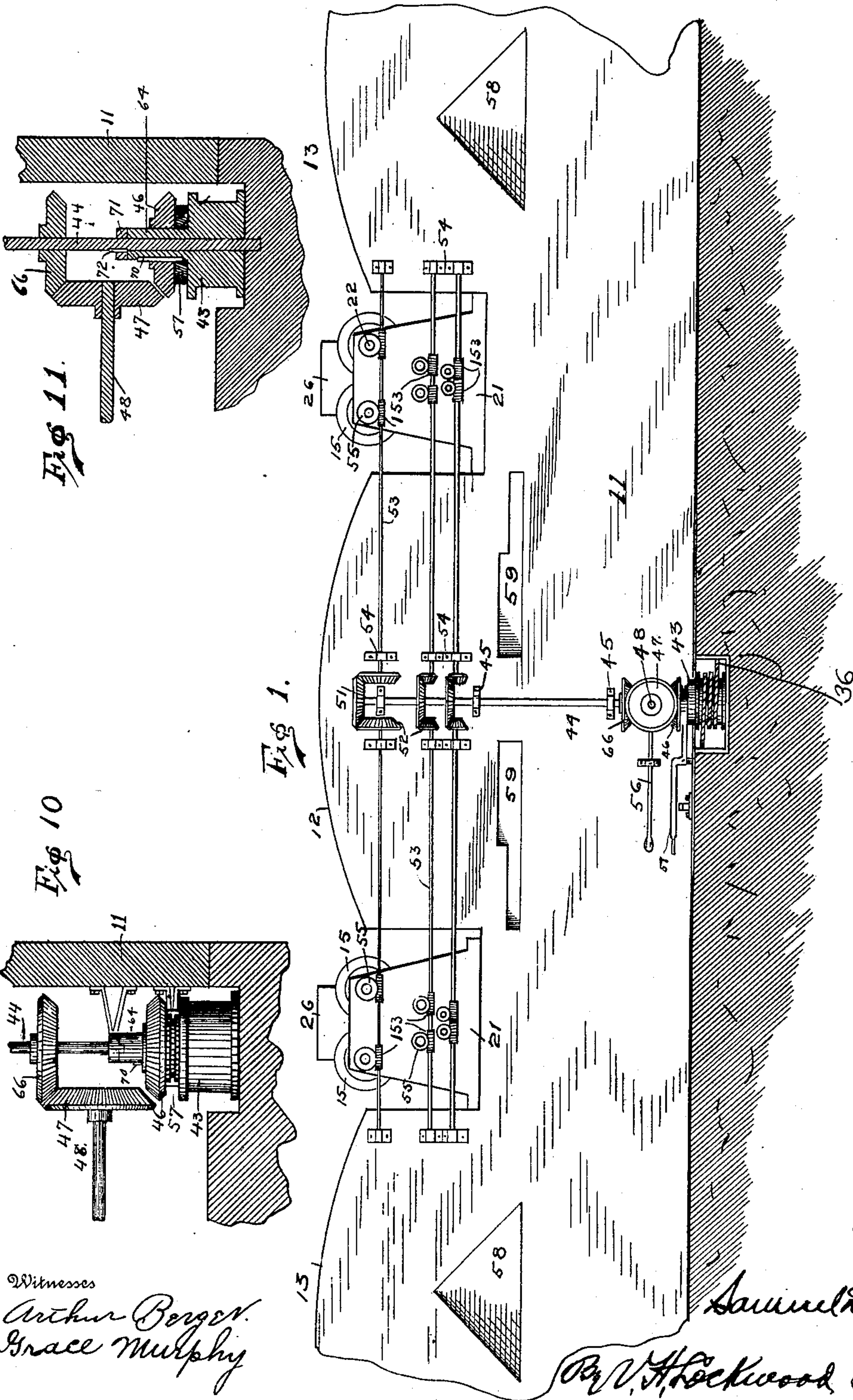
S. DEELEY.

SHEET GLASS MACHINE.

APPLICATION FILED MAR. 25, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Inventor

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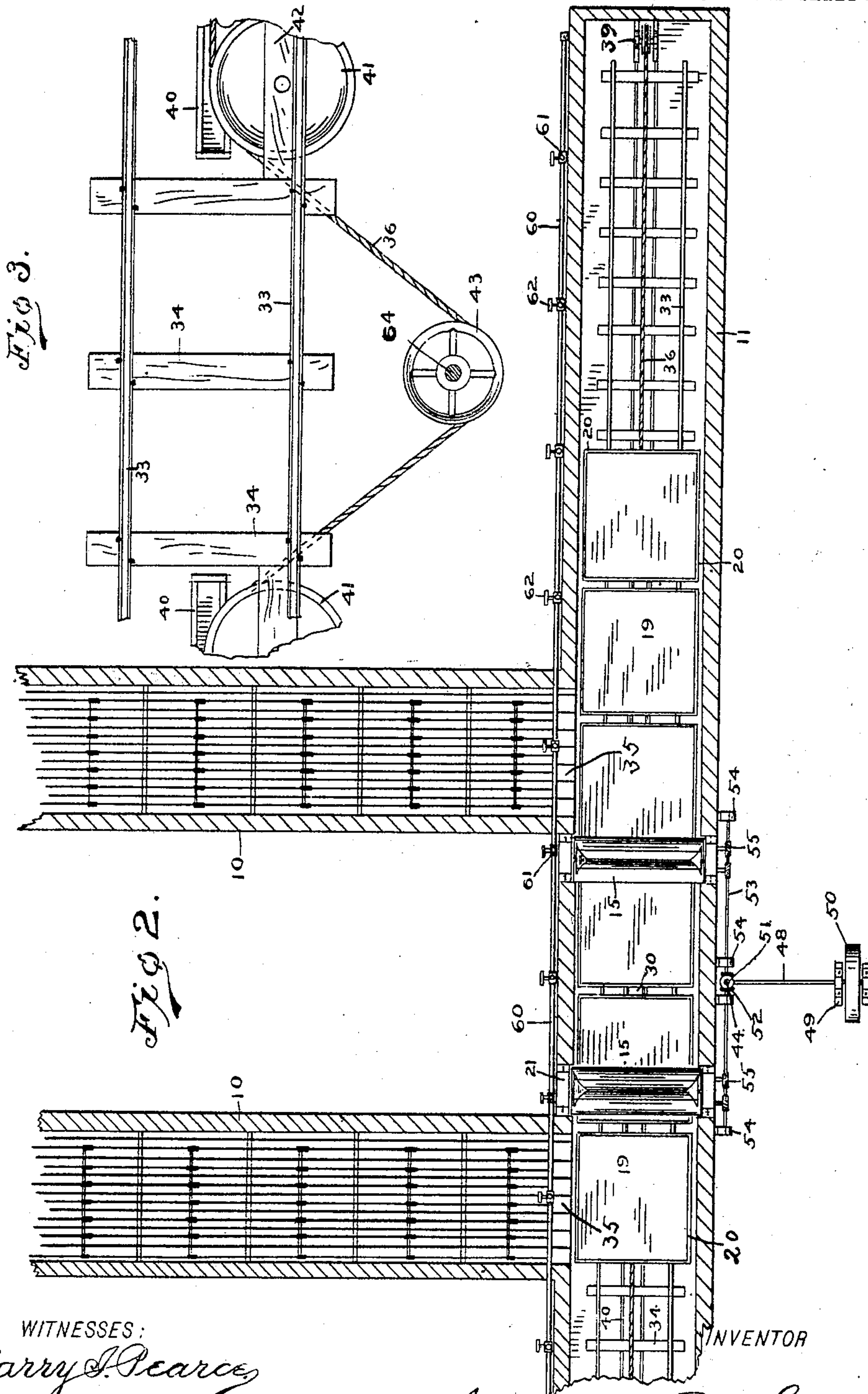
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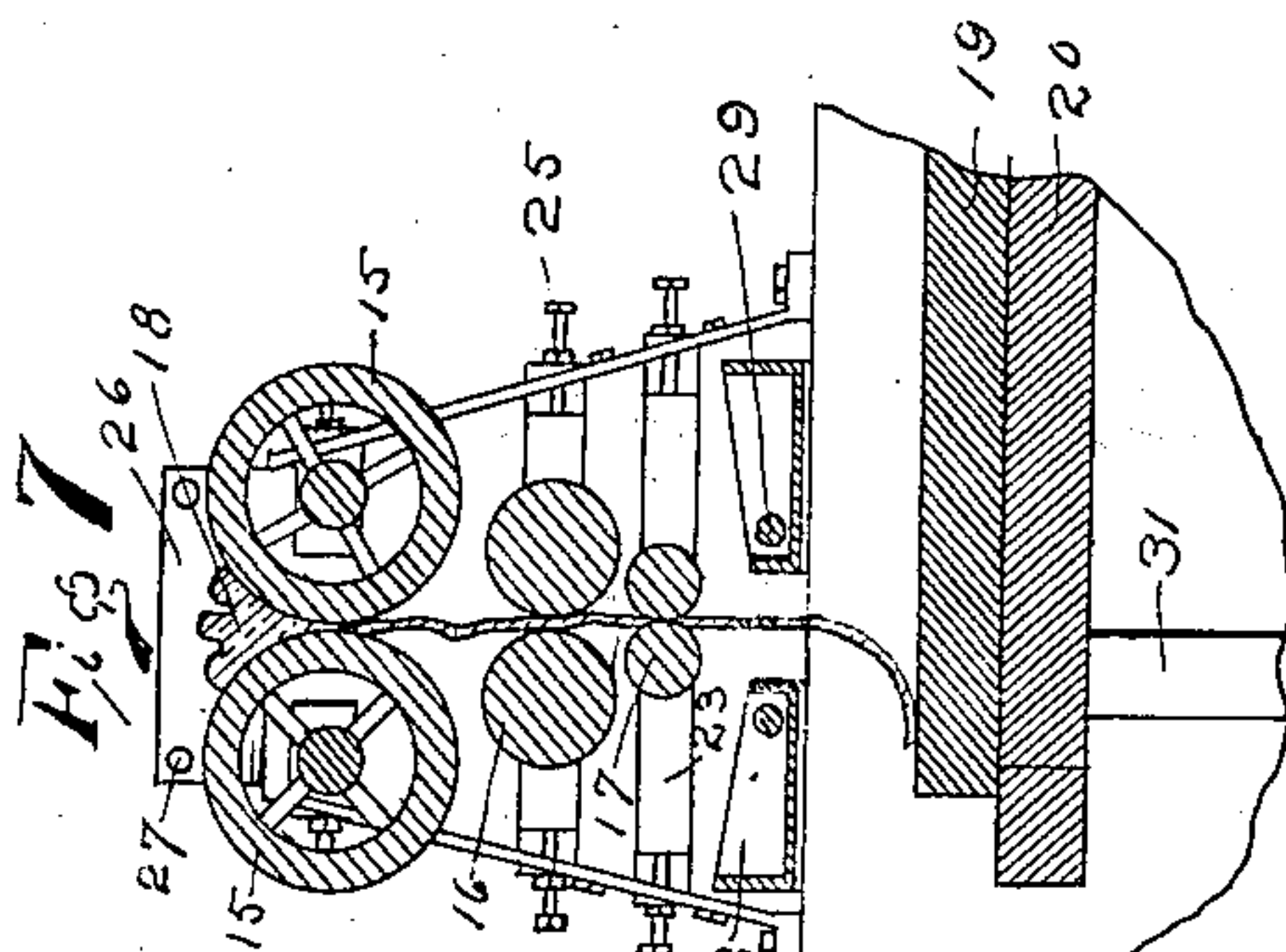
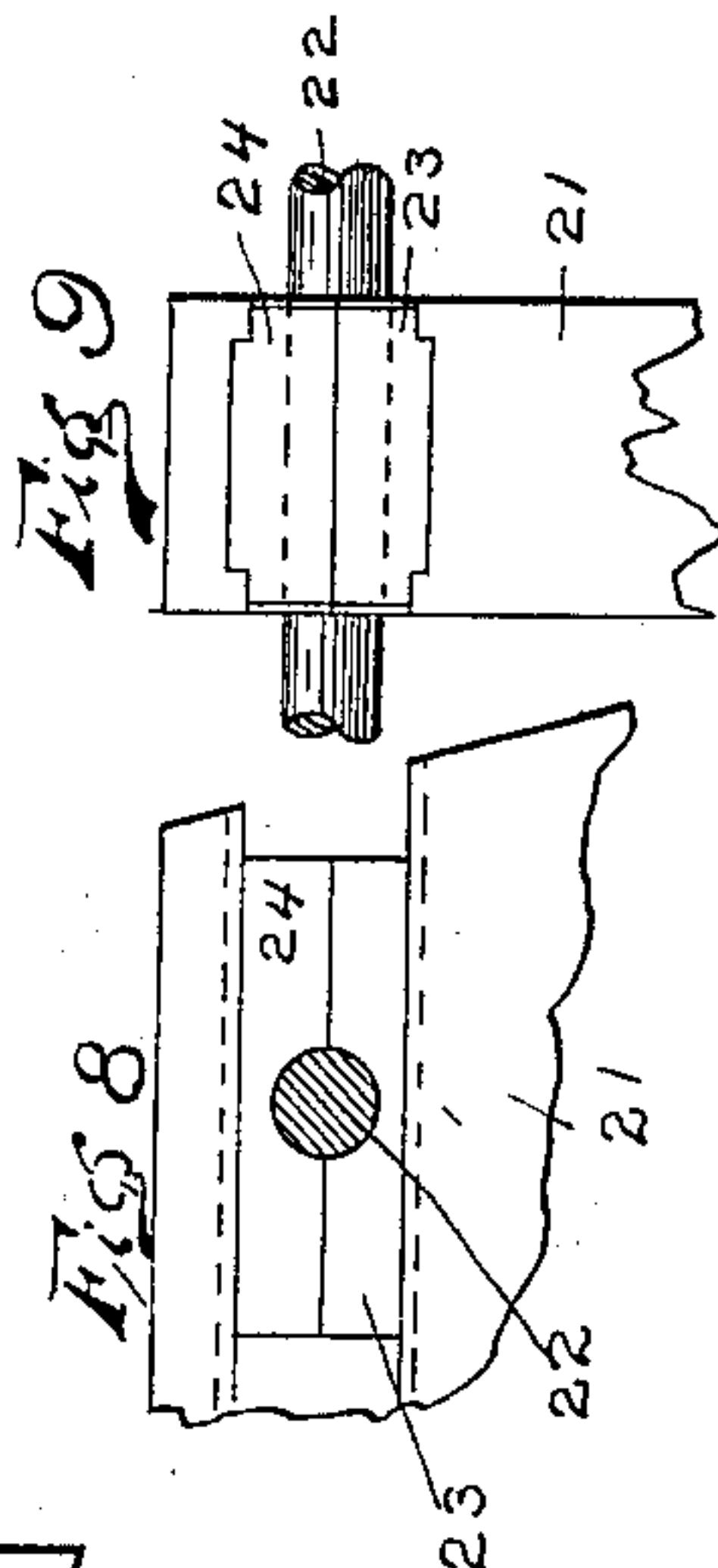
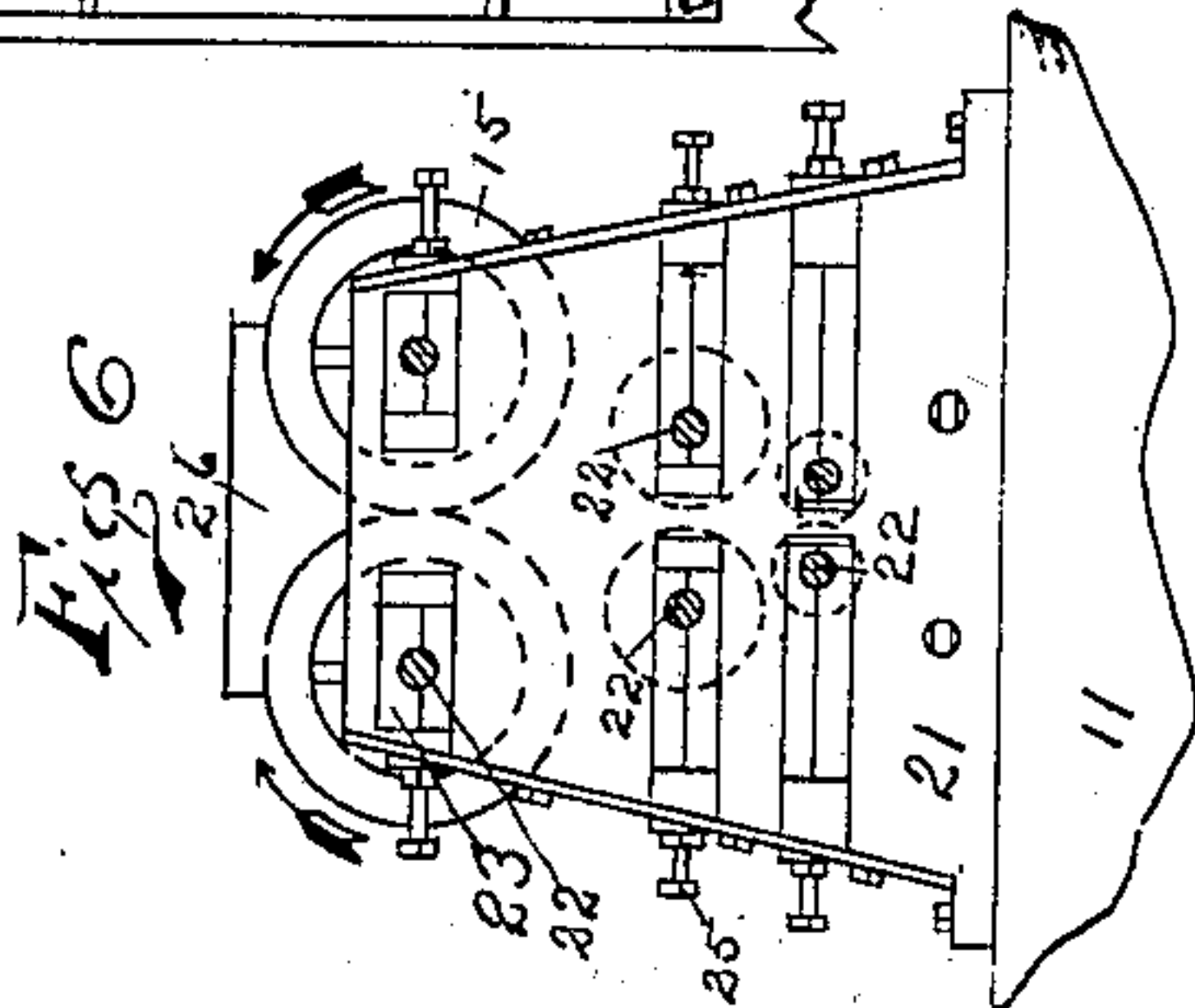
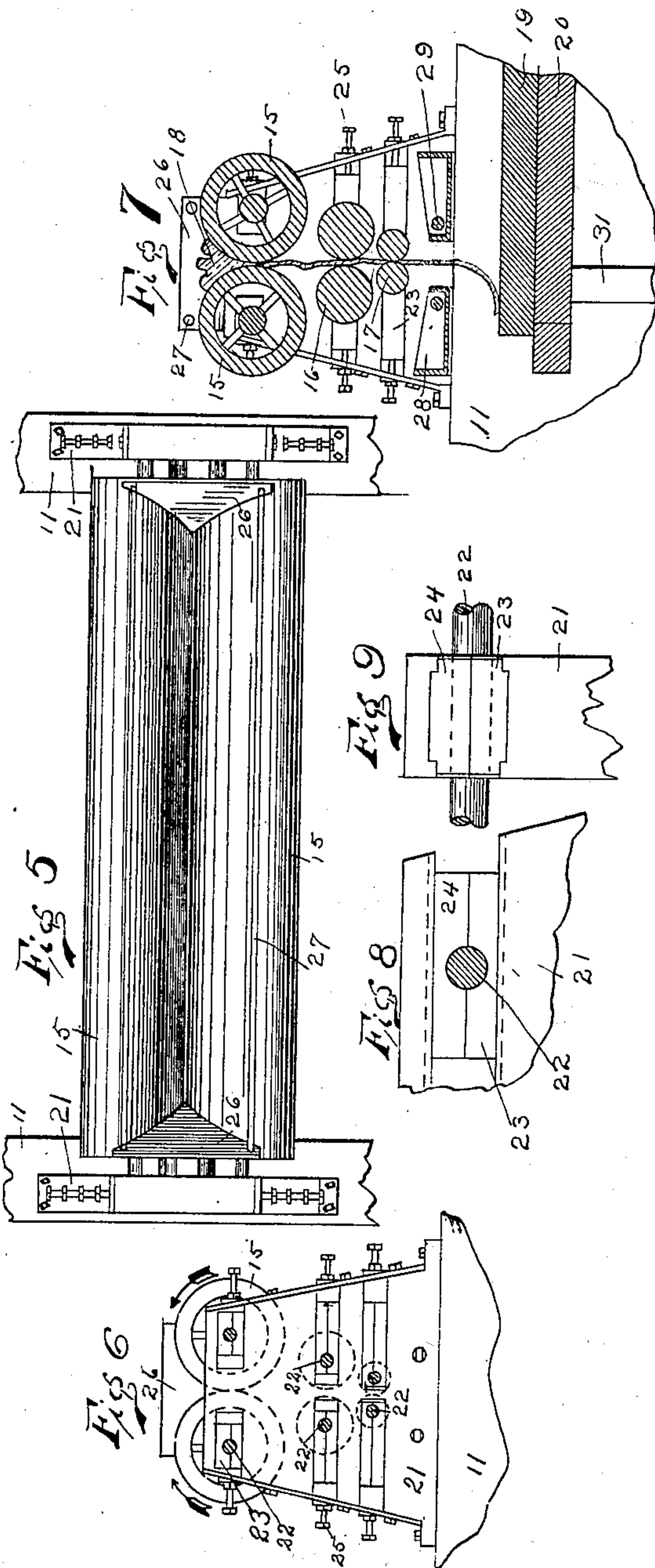
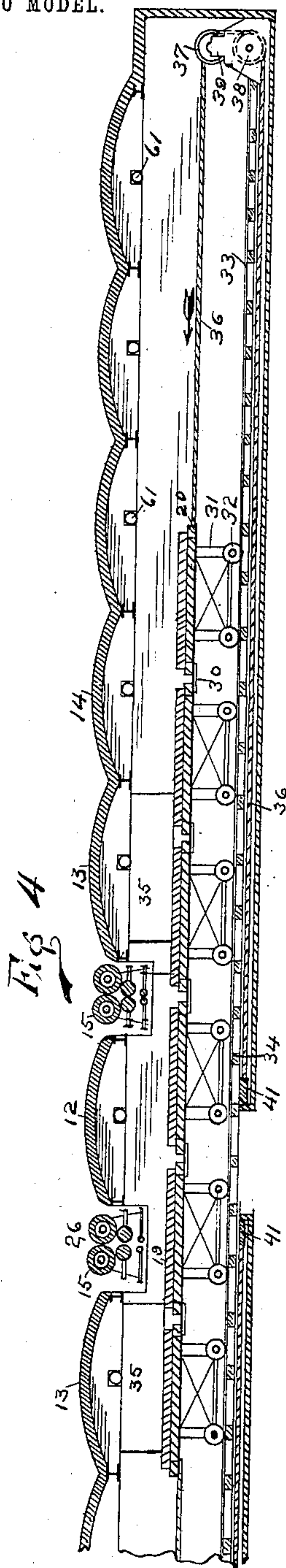
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3 SHEETS—SHEET 3.



Inventor

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UNITED STATES PATENT OFFICE.

SAMUEL DEELEY, OF CONVERSE, INDIANA, ASSIGNOR OF ONE-HALF TO
JOHN STOHN, OF ARCADIA, INDIANA.

SHEET-GLASS MACHINE.

SPECIFICATION forming part of Letters Patent No. 754,752, dated March 15, 1904.

Application filed March 25, 1903. Serial No. 149,594. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL DEELEY, of Converse, county of Miami, and State of Indiana, have invented a certain new and useful Sheet-Glass Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like numerals refer to like parts.

The object of this invention is the construction of a practical apparatus for the manufacture of sheet-glass for window-glass and the like without blowing and by mechanical means.

The chief novel feature of this invention consists in combining two sets of rolls through which plastic glass may be passed to form a sheet with a reciprocating conveyer to receive said sheet and a leer, between the mouth of which and the rolls the conveyer reciprocates for receiving a sheet of glass as it comes from the rolls and transferring it to the mouth of the leer. This idea is carried further by providing two sets of rolls and two leers with a single conveyer reciprocating between them, so that the rolls may be alternately used and the conveyer be transferring the sheet of glass while moving in either direction.

In addition to the foregoing features of invention are the improvements in details of construction, all of which will appear from the accompanying drawings and the following description and claims.

In the drawings, Figure 1 is a front elevation of the central portion of the apparatus. Fig. 2 is a horizontal section of a portion of the apparatus, parts being shown in plan. Fig. 3 is a detail plan view of a portion of the means for operating the conveyer. Fig. 4 is a vertical longitudinal section near the center of the portion of the apparatus in which the sheet-glass is formed, one end being broken away. Fig. 5 is a plan view of one set of rolls, parts of the supports being broken away. Fig. 6 is an end elevation of one set of rolls, a part of the support being broken away. Fig. 7 is a central vertical section of one of the sets of rolls with the glass shown as it is being formed and a conveyer for receiving it, parts being broken away. Figs. 8 and 9 are details of the

mounting of the roll-shafts. Fig. 10 is an elevation of the cable-drum and reversing-lever with other parts in section. Fig. 11 is a central vertical section of the cable-pulley and reversing apparatus.

I do not wish to limit myself to the details of construction shown herein, as it is for the purpose of explaining the general nature of my invention.

Referring to the construction shown, I provide two leers 10, parallel with each other and separated somewhat, substantially as shown. There is nothing new or peculiar about these leers, and my invention will be understood without explaining the details of their construction. What I call a "kiln" 11 is constructed at a right angle to said leers, extending past one end of the leers to a point about equidistant on each side and connected with said leers, so that there is an opening from the kiln into each of the leers. This kiln may be of any desired length or construction; but as shown its top is divided into sections. The section 12 is midway between the ends of the leers, while the sections 13 are at the ends of the leers and register therewith. The other sections 14 extend to the right and left of the central section mentioned. The sections 13 and 14 are adjacent each other, while the section 12 is separated somewhat from the sections 13 and leave a space for a set of rolls on each side of said central section 12. These rolls consist, in what is herein shown, of three series of rolls 15, 16, and 17. They are horizontally mounted in pairs, the rolls of each pair being mounted in the same horizontal plane and their peripheries bearing against each other. The diameters of the three series of rolls are graduated, the larger rolls being placed above and immediately under them the medium rolls 16 and immediately under the latter the small rolls 17. The contacting points of the different pairs of rolls are therefore in the same vertical line, so that the molten glass 18 deposited on the upper pair of rolls 15 will pass down between said rolls in a sheet that will proceed downward between the rolls 16 and the rolls 17 until it reaches the stone 19 on the moving conveyer 20,

as shown in Fig. 7. Said rolls are mounted in stands 21, secured on each side of the kiln and facing each other. The shafts 22 of the rolls have their bearings in a pair of bearing-blocks 23, whose adjacent faces are provided with semicircular bearing-grooves that register with each other. Said blocks are provided with dovetailed extensions 24, as seen in Fig. 9, that fit in corresponding laterally-extending grooves in the stands 21, so as to be laterally movable, as shown in Fig. 6. On the upper pair of rolls a pair of triangular end plates 26, connected by the bars 27, loosely rest, there being one at each end of a pair of rolls to prevent the glass from flowing over the ends of the rolls. Under each set of rolls there are fire-boxes 28, extending from one side wall to the other of the kiln 11 and provided with openings 29, through which gas-pipes may be inserted for warming the rolls at the beginning of the operation of the apparatus. I also place sawdust in said fire-boxes and set it on fire for smoking the rolls. After the rolls are initially heated and the operation of the device begun the hot glass will keep them at the proper temperature.

In the kiln I show a conveyer consisting of a number of carriages 20, connected by couplings 30. Said carriages have a top portion for supporting the stone 19 and a frame 31, carried on wheels 32, said wheels being adapted to move on the rails 33 of a track extending centrally and longitudinally of said kiln and formed of the rails 33 and the cross-ties 34. The width of these carriages is somewhat less than the sections of the kiln, and their tops move just below the sets of rolls and close to and at the same level as the openings 35 into the leers, so that glass can be readily moved by a workman from the conveyer into the leer.

The conveyer is moved by a cable 36, which is connected at each end to the respective ends of the series of carriages and passes over a pair of pulleys 37 and 38, the latter shown in dotted lines and mounted in the stands 39 at each end of the kiln, so that said cable extends beneath the track on which the conveyer-carriages move. A trough 40 is placed beneath the track in which said cable may move, as appears in Figs. 3 and 4. About midway of the kiln a pair of horizontal pulleys 41 are mounted in the timbers 42, against which a cable 36 moves in passing around its driving-drum 43, and by this means the cable is moved first in one direction and then in the other, so as to reciprocate the conveyer from one end of the kiln to the other.

The cable-driving drum 43 is secured to a vertical spindle 64, fitting loosely on the lower end of the shaft 44. Said shaft is mounted vertically in the bearings 45 and near its lower end carries the bevel-gear 66, that is driven constantly by the bevel-gear 47 on the horizontal shaft 48, mounted in the bearings

49 and driven by a pulley 50 from any suitable source of power.

The rolls are driven by a series of bevel-gears 51 on the vertical shaft 44, that mesh on each side with the bevel-gears 52, secured on oppositely-extending shafts 53, mounted in the bearings 54 and carrying worms 153. There is one pair of these worms for each pair of rolls, and those on each shaft mesh with a pair of oppositely-cut worm-gears 55, secured on the shafts 22 of the rolls, whereby the rolls of each pair will be driven in opposite directions.

The spindle 64 has loosely mounted on it the bevel-gear 46, so that said gear may be vertically slidable by means of the lever 57 to move it into or out of engagement with the bevel-gear 47. A key 70 is secured to said spindle 64, that fits loosely in a groove in the gear 46, so the latter is vertically movable on the spindle 64, so that when said gear 46 is elevated it will be actuated by the gear 47 in a direction opposite to the gear 66 and will rotate the drum in a reverse direction; but when the gear 46 is in its lower position it will disengage the gear 47. There is a clutch 71, slidably mounted on the shaft 44 by a key 72, that engages the upper end of the spindle 64 and actuates it when it is depressed by the lever 56, and thereby rotates the drum, but does not do so when the clutch is elevated by the lever 56 out of engagement with the spindle 64. In other words, this construction is such that the shaft 44 rotates constantly and drives the rolls always in the same direction, whereas the drum rotates alternately in one direction or the other for reciprocating the conveyer. When the clutch 71 and the gear 46 are lowered, the shaft 44 will drive the conveyer in one direction, and when they are elevated the gear 46 and spindle 64 will drive the conveyer in the opposite direction. When the clutch 71 is elevated and the gear 46 is lowered, leaving the levers 56 and 57 toward each other, the conveyer will be stopped. This part of the mechanism may be of any suitable arrangement familiar to mechanics, as it constitutes no part of the invention, and I do not wish to be limited to what is herein shown. There are openings 58 through the side of the kiln opposite the leers, whereby the operator can readily transfer the sheets of glass from the conveyer into the mouths of the leers. Openings 59 are provided in the central section 12 for inserting the means for flattening the glass. The gearing is such that the movement of the conveyer and of the peripheries of the rolls will be at the same speed.

Behind the kiln there is a gas-pipe 60 with nozzles 61 extending from it into the kiln at each section and having valves 62 for regulating the supply of gas, so as to control the temperature of the kiln and the various parts thereof.

In the operation of the double apparatus which I here show a man stands beside the kiln in front of the mouth of a leer for removing the glass from the conveyer into the leers as the conveyer-carriages pass the mouth of the leers. Another man stands in front of the openings 59 of the central section 12 between the two sets of rolls for flattening the glass on the stones. While the conveyer is moving in one direction—say to the right—glass is introduced only through the left set of rolls, and while the conveyer is moving in the opposite direction glass is introduced only through the right set of rolls. When the conveyer is moving to the left, as shown in Fig. 4, glass is being supplied to the conveyer through the right set of rolls, and as the glass comes down from between the rolls, as shown in Fig. 7, the conveyer moves to the left with the same speed as the sheet of glass moves down, so that the glass will not be drawn or jammed, but will move off to the left on the stone on the conveyer and lie flat thereon unharmed by the movement of the conveyer. To accomplish this result, it is necessary to have a single or common means for driving both the conveyer and the rolls, whereby the same speed will always be maintained, for any different speed would cause the sheets of glass to be injured or destroyed by the conveyer. As the foremost conveyer with the first sheet of glass moves to the left through the middle section 12 of the kiln the flattener flattens the sheet of glass and smooths it out in the usual way and by any usual means. While he is doing that another sheet of glass is coming down through the rolls on the flattening-conveyer, and as that second sheet of glass comes to him he flattens it in the same way. As the conveyer moves farther the carriage carrying the first sheet of glass will come opposite the mouth 35 of the left-hand leer, and the workman standing at that point removes said sheet of glass from the conveyer into the leer. He continues to do this with the subsequent sheets of glass until the conveyer has reached its limit of movement or passed in its movement in a direction to the left. Then the movement of the conveyer is reversed, and the workman whose duty it is to remove the glass from the conveyer to the leers changes his position to the right-hand leer, and therefore the glass is introduced into the left-hand set of rolls, and as the glass comes to the flattener and to the right leer it is treated in the same manner as above described.

In the operation of this apparatus the chief function of the kiln 11 is to furnish room for the operation of the conveyer-carriages and keep them properly heated. The annealing is done by the leers. No means for conveying the molten glass to the sets of rolls has been shown, as it constitutes no necessary part of this invention. It may be done by a trolley-like apparatus extending from the pot to

a point above the rolls or by any other means heretofore used for substantially similar purposes. Each charge of glass should preferably be sufficient to form one plate of glass. The function of the rolls of each set is to convert the irregular mass of molten glass into sheet form. The upper and larger pair of rolls are preferably not set quite so close together as the lower rolls, and they convert the body of glass into a sheet, but do not leave the sheet smooth. The function of the lower rolls 16 and 17 is to further smooth and remove the wrinkles and irregularities in the surface from the sheet of glass and to give to it its final thickness.

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

1. A sheet-glass machine including two oppositely-placed stands, a series of pairs of rolls mounted between said stands, said pairs being mounted one above the other and in line with each other, and a fire-box extending between said stands under said rolls and on each side of the central line thereof.

2. A sheet-glass machine including two sets of rolls mounted apart from each other, each set of rolls being adapted to receive plastic glass and pass the same through them to form a sheet, and a reciprocating conveyer movable beneath said two sets of rolls for receiving on its surface the sheets of glass as the same come from said rolls.

3. A sheet-glass machine including a leer, a kiln adjacent one end of the leer with an opening from the kiln to the leer, a reciprocating conveyer movable in said kiln that passes the mouth of said leer, a pair of cooperating rolls mounted over said conveyer at a point removed from the mouth of the leer, said rolls being beside each other and between which the plastic glass may pass, and means for actuating said conveyer and rolls.

4. A sheet-glass machine including a pair of separate leers, a reciprocating conveyer that passes close to the mouths of said leers and at substantially the same level, and two sets of cooperating rolls mounted between the mouths of said leers over said conveyer and through which the glass may be passed to form it into a sheet that is deposited upon said conveyer.

5. A sheet-glass machine including a pair of separate leers, a conveyer that passes close to the mouths of said leers and at substantially the same level, two sets of cooperating rolls mounted between the mouths of said leers over said conveyer and through which the glass may be passed to form it into a sheet that is deposited upon said conveyer, and means for reciprocating said conveyer so that glass may be formed and conveyed while the conveyer is moving in either direction.

6. A sheet-glass machine including a pair of parallel leers separated from each other, a kiln adjacent the ends of said leers with an opening from the kiln into each leer, a conveyer

movable in said kiln to pass the mouth of said
leers, two sets of coöperating rolls mounted
between the mouths of said leers and extend-
ing over said conveyer through which the
5 glass may be passed to convert it into a sheet,
said sets of rolls being separated to form a
flattening-chamber between them, and means
for actuating said rolls and conveyers.

In witness whereof I have hereunto affixed
my signature in the presence of the witnesses 10
herein named.

SAMUEL DEELEY.

Witnesses:

ROSCOE KIMPLE,
HENRY MINNICK.