L. J. KREBS.

APPARATUS FOR DRAWING SHEET GLASS.

APPLICATION FILED JAN. 17, 1914.

1,136,816.

Patented Apr. 20, 1915.

3 SHEETS—SHEET 1.

Fig. 1.

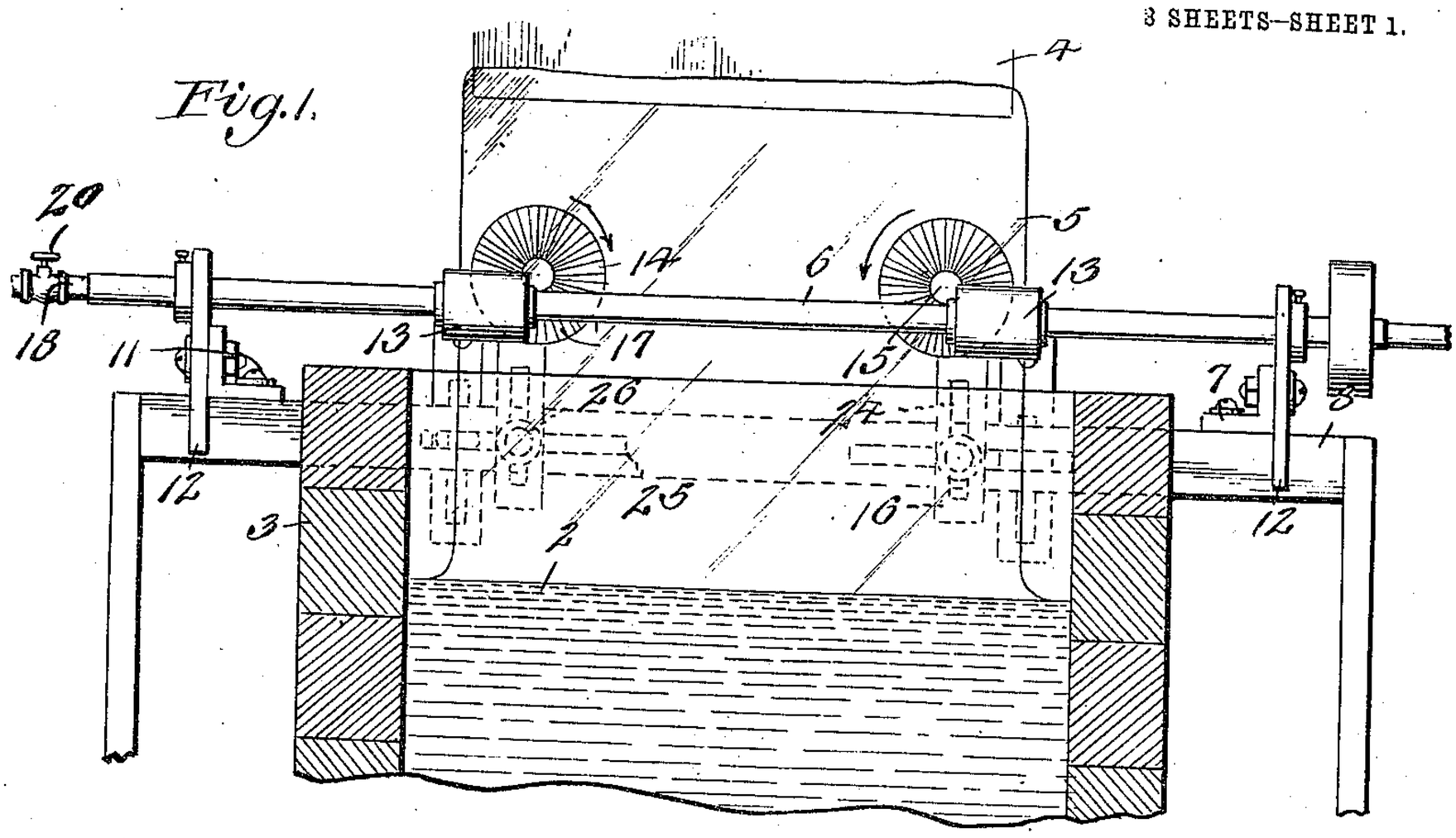


Fig. 2.

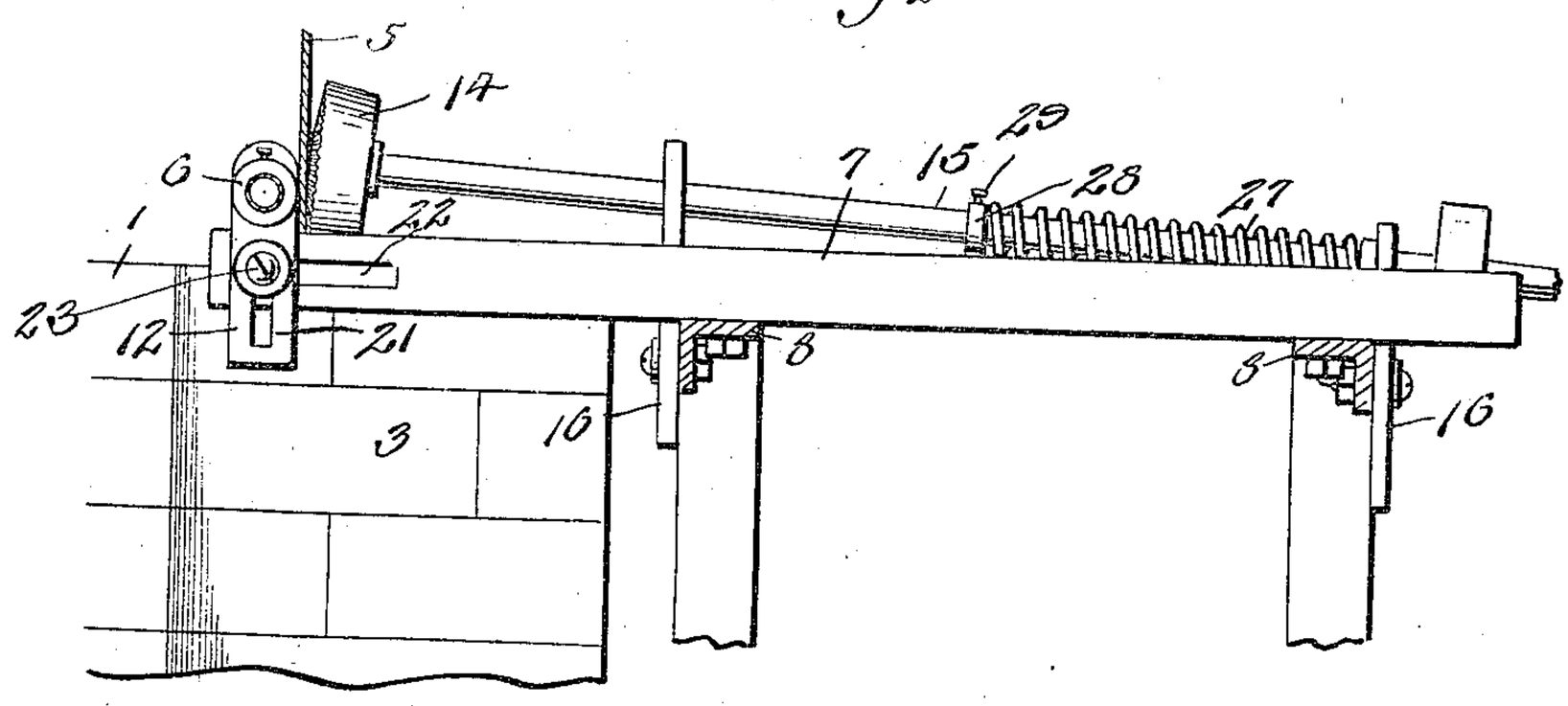
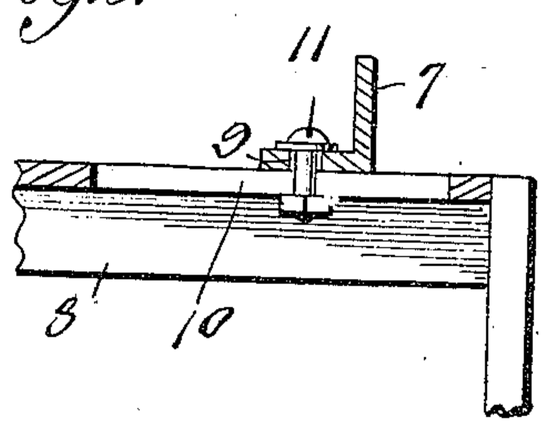


Fig. 5.



Witnesses
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3 SHEETS—SHEET 2.

Fig. 3.

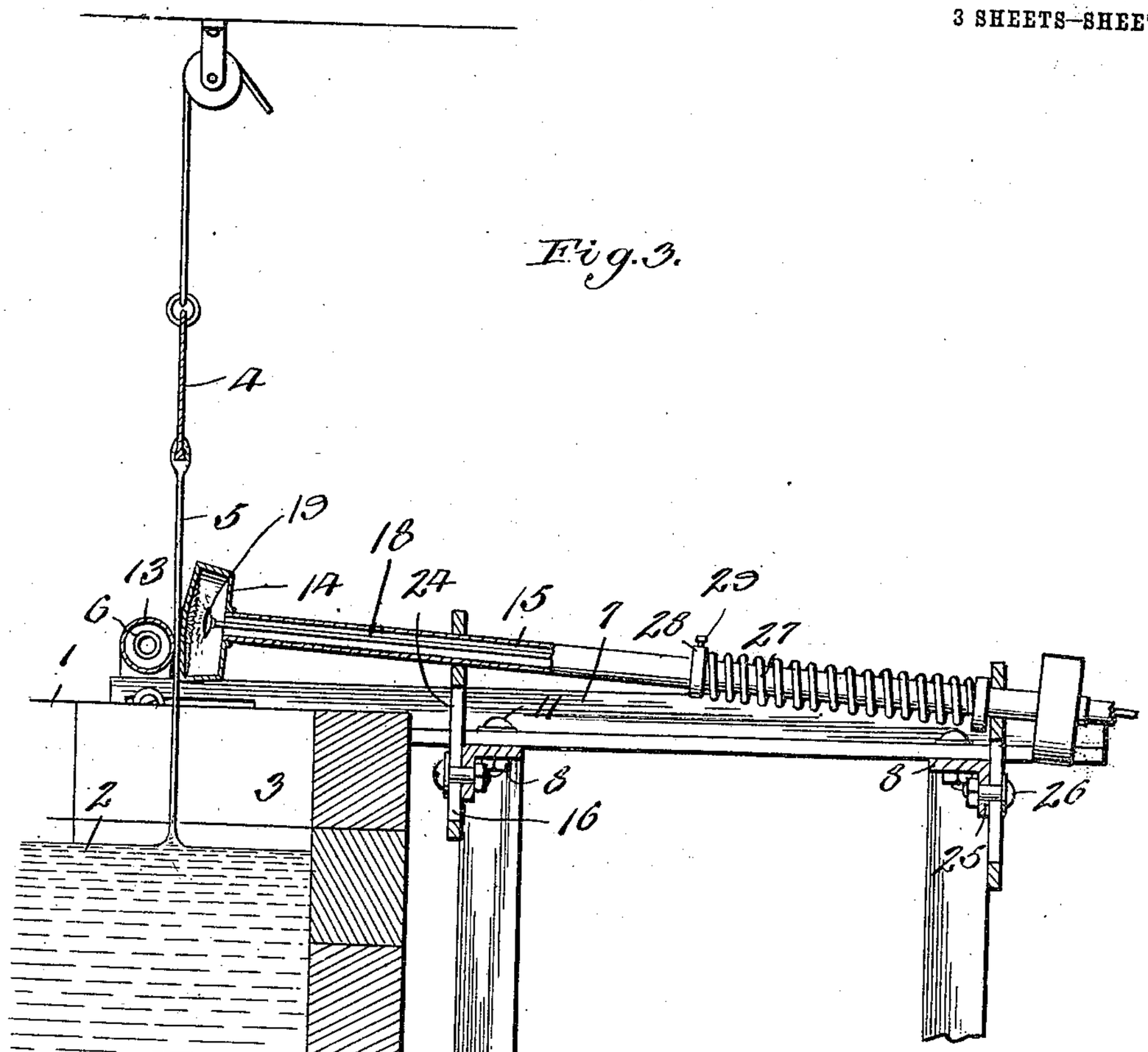


Fig. 7.

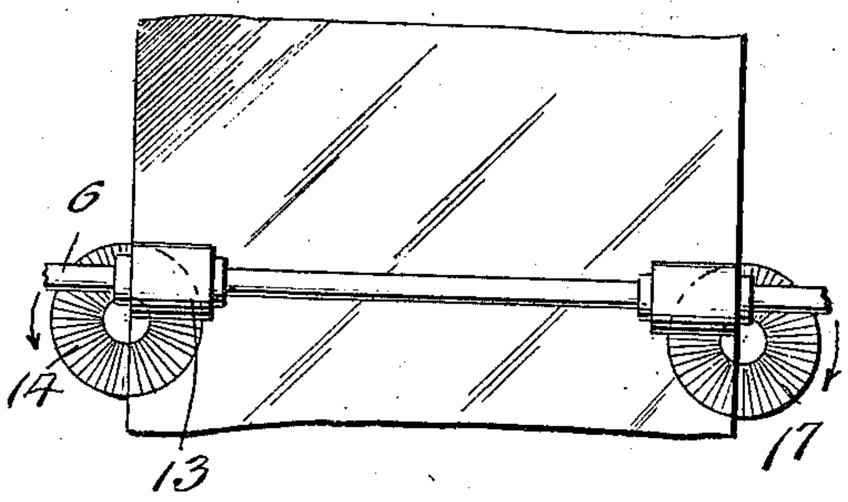
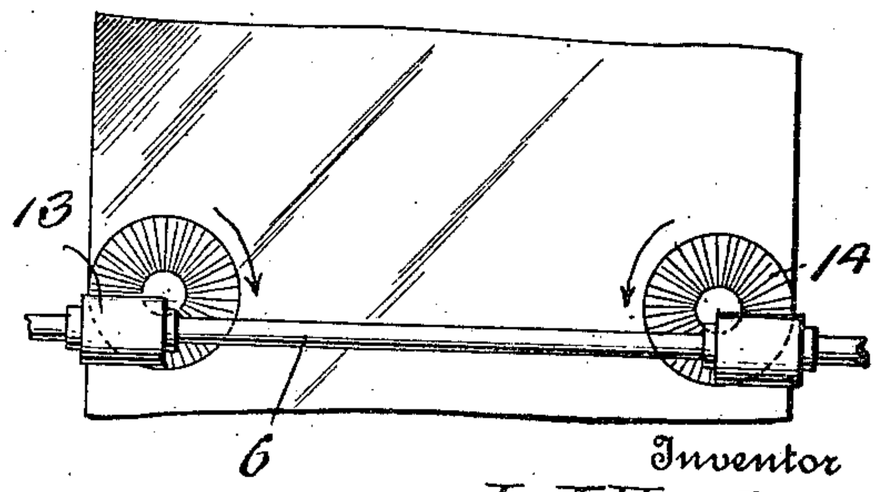


Fig. 8.



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3 SHEETS—SHEET 3.

Fig. 4.

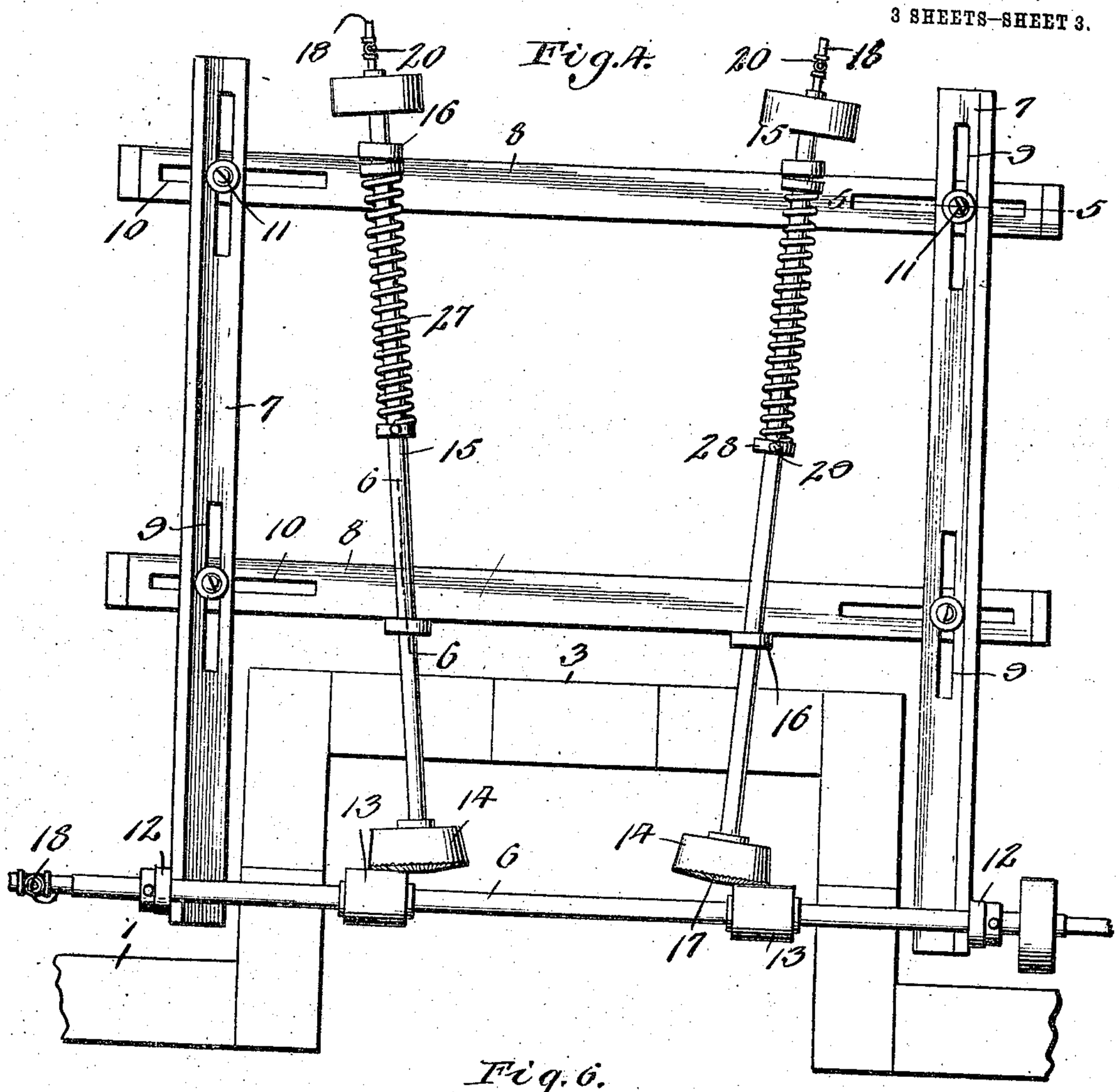
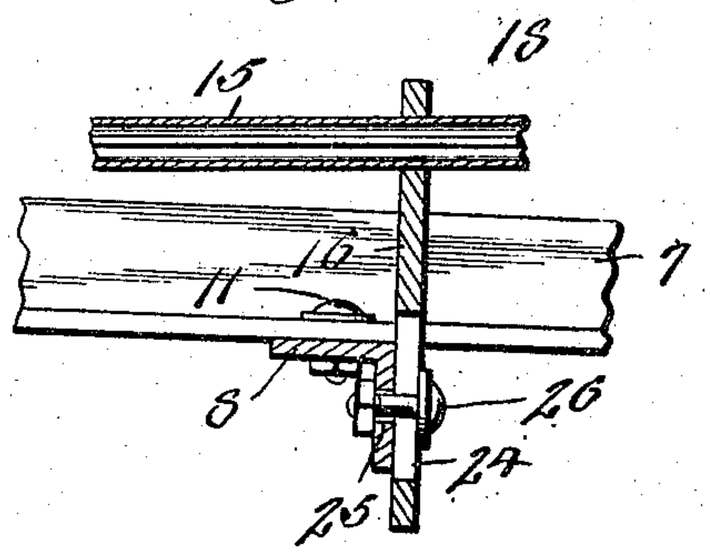


Fig. 6.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR DRAWING SHEET-GLASS.

1,136,816. Specification of Letters Patent. Patented Apr. 20, 1915.

Application filed January 17, 1914. Serial No. 812,834.

To all whom it may concern:

Be it known that I, LOUIS J. KREBS, a citizen of the United States, residing at Coffeyville, in the county of Montgomery and State of Kansas, have invented new and useful Improvements in Apparatus for Drawing Sheet-Glass, of which the following is a specification.

This invention relates to an apparatus for drawing sheets of glass from a mass of molten glass, and particularly to means for drawing a continuous sheet of glass of substantially uniform width and thickness, the primary object of the invention being to provide a novel and improved means to act upon the drawn sheet to spread the sheet laterally, thereby overcoming the tendency of the sheet to narrow as it is drawn out.

A further object of the invention is to provide an apparatus for insuring the positive feed of the sheet of glass and spreading it in the manner described in a uniform manner, so that a sheet which is substantially uniform in width and thickness may be continuously drawn.

A still further object of the invention is to provide a spreading mechanism which is simple of construction, reliable and efficient in action, which embodies means for cooling the same to prevent undue heating thereof, and which is adjustable to vary the character of the lateral spreading action as well as to dispose the spreading devices as occasion may require above the tank or receptacle containing the mass of molten glass.

The invention consists of the features of construction, combination and arrangement of parts herein fully described and claimed, reference being had to the accompanying drawings in which:—

Figure 1 is a vertical transverse section through a portion of a glass drawing apparatus embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical longitudinal section. Fig. 4 is a top plan view. Figs. 5 and 6 are detail longitudinal and transverse sections on the lines 5—5 and 6—6 of Fig. 4 through parts of the frame of the spreading devices. Figs. 7 and 8 are diagrammatic elevational views illustrating different positions and spreading actions of the spreading rollers.

Referring to the drawings, 1 designates a ank or other suitable receptacle, in which s contained the body 2 of molten glass, from hich the glass in sheet form is to be drawn, which tank or receptacle may be heated in any known or approved manner. The tank or receptacle may be of that type having a contracted mouth or "dog-house" 3 exposing a portion of the body of molten glass from which the sheet glass is directly drawn through the medium of a bait 4 of suitable construction, operated in any known or suitable manner. In the drawings I have shown, for the purpose of illustrating the operation of my invention, a glass sheet 5 which is being drawn continuously by the action of the bait from the mass of molten glass.

In the operation of drawing sheet glass from a molten mass by a direct drawing action, difficulty is experienced in drawing a sheet of uniform width, since under the drawing action the tendency is to draw the sheet of glass to a narrow rod or thread, the sheet narrowing in its direction of drawing out motion and thus rendering it impossible to produce a sheet of regular width and thickness.

My invention provides a mechanism which is designed to act upon the sheet of glass adjacent the point where it is drawn from the body of molten glass, to spread the glass laterally in opposite directions as it is drawn out, thus counteracting its narrowing tendency and insuring the production of a continous sheet of glass of substantially uniform width and thickness throughout. The mechanism designed for this purpose is adapted for use in connection with any ordinary glass drawing apparatus of the type defined, sufficient only of a known drawing apparatus being shown to clearly illustrate the invention.

The spreading mechanism comprises a transverse shaft 6 which extends over the mouth or "dog-house" 3 of the tank 1 and is supported, with the other parts of the spreading mechanism, by a horizontal frame structure comprising a pair of longitudinal beams 7 and a pair of transverse beams 8 connected at intervals with said longitudinal beams. At their points of crossing the respective beams 7 and 8 are provided wit slots 9 and 10 for the passage of coupling bolts 11, the construction thus being such that the beams 7 may be adjusted with relation to each other to increase or diminish the width of the frame, and also adjusted longitudinally on the beams 8 to dispose the shaft 6 as required across the mouth of the melting tank or part. While the beams 7

are adjustable as described, the beams 8 are preferably fixed to a base or foundation or to the frame work of the glass drawing apparatus.

As shown, the shaft 6 is journaled in bearing brackets 12 carried by the adjacent ends of the beams 7, and on said shaft 6 are mounted hollow guide rolls 13 which are fixed to the shaft to rotate therewith and are properly spaced to bear upon one side of the sheet 5 adjacent to the side edges thereof, and but a short distance above the surface of the body of molten glass from which the sheet is drawn.

Arranged for coöperation with the rolls 13 are spreading rolls 14, each mounted upon a longitudinally extending shaft 15 journaled in bearing brackets 16 projecting upwardly from the beams 8, said rolls being provided with roughened or serrated surfaces 17, which bear upon the opposite side of the sheet 5 from the respective rolls 13 and are fixed to and revolve with the shafts 15.

The shafts 6 and 15 and rolls 13 and 14 are hollow, the respective rolls being in communication with their respective shafts in such manner that water may be circulated therethrough to cool the shafts and rolls and prevent the same from being heated to an excessive degree from the glass. Each shaft 6 and 15 is hollow and incloses a water feed or supply pipe 18, and the respective pipes 18 connect with suitable spray or discharge devices 19 arranged within the hollow rolls 13 and 14, by which cooling water is supplied thereto, the water flowing back and discharging through the pipes 6 and 15, as will be readily understood. Valves 20 are provided in the pipes 18 to control the supply of the cooling water. The bearing brackets 12 are provided with slots 21 and the adjacent ends of the beams 7 are provided with slots 22, through which slots pass bolts 23, whereby the brackets are secured in position and may be vertically or longitudinally adjusted to support the pipe 6 at different elevations or at different positions over the mouth of the melting tank. The brackets 16 are similarly provided with slots 24 and the beams 8 with slots 25, through which slots pass coupling bolts 26 securing the brackets to the beams, the connection being such that the bracket may be vertically adjusted or adjusted in a direction transversely of the frame, as will be readily understood.

The serrated faces 17 of the rolls 14 are adapted to bear upon the drawn sheet 5 and brace the same against the guide rolls 13, and said rolls 14 are rotated in such manner as to exert a lateral drawing or spreading action on the sheet, thus counteracting its tendency to narrow as it is drawn out. The shafts 15, in addition to being journaled for rotation in the brackets 16, are also longitudinally slidable therein, and a coiled spring 27 is provided for sliding each shaft 15 forwardly and holding the associated roll 14 with the required pressure in contact with the drawn sheet. One end of this spring bears against one of the rear brackets 16 or any other suitable abutment and the other end of the spring is arranged to bear against an adjustable abutment comprising a collar 28 secured to the shaft by a set screw 29, whereby the tension of the spring and the pressure of the roller 14 may be regulated.

By adjustably mounting the rollers 13 and 14 in the manner described, the rolls 14 may be disposed so that their axes will be below the plane of the shaft 6, and so that approximately one-half of each roll will be arranged beyond the edge of the sheet and the other half of the roll in position to engage the sheet, as shown in Fig. 7, so that on rotating the rolls in an inward and upward direction, as indicated by the arrows as shown in said Fig. 6, a drawing and lateral spreading action will ensue; or the rolls 14 may be disposed so that their axes come above the shaft 6 and closer to each other and so that the outer halves of the rolls will press the sheet against the rolls 13, as shown in Figs. 1 and 8, whereby on rotating the rolls 14 in a downward and outward direction, as shown by the arrows in said figures, a lateral spreading action on the sheet 5 will be established. The guiding and spreading rolls may accordingly be adjusted to suit varying conditions of service and in action will effectually overcome the tendency of the sheet to narrow as it is drawn out from the mass of molten glass, thereby insuring the production of a sheet of substantially uniform width and thickness.

It will of course be understood, that, in practice, the rolls may be driven by any suitable power.

I claim:—

1. In an apparatus for drawing sheet glass, a rotary shaft, guide rollers carried by said shaft to bear against one face of the sheet as drawn, a pair of rotary shafts arranged at an angle to the first-named shaft, spreader rollers carried by said shafts in line with the guide rollers and arranged to bear against the opposite face of the sheet and to laterally spread the same to maintain a uniform width thereof, and means for rotating the respective shafts.

2. In an apparatus for drawing sheet glass, a rotary shaft, guide rollers carried by said shaft to bear against one face of the sheet as drawn, a pair of rotary shafts arranged at an angle to the first-named shaft, spreader rollers carried by said shaft in line with the guide rollers and arranged to bear against the opposite face of the sheet and to

laterally spread the same to maintain uniform width thereof, means for adjusting the second-named shafts to vary the relationship of the axes of the rollers, and means for rotating the respective shafts.

3. In an apparatus for drawing sheet glass, a rotary shaft, guide rollers carried by said shaft to bear against one face of the sheet as drawn, a pair of rotary shafts arranged at an angle to the first-named shaft, means for adjusting said pair of rotary shafts in a vertical direction and horizontally toward or from each other, spreader rollers carried by said shafts in line with the guide rollers and arranged to bear against the opposite face of the sheet to laterally spread the same to maintain a uniform width thereof, and means for rotating the respective shafts.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS J. KREBS.

Witnesses:
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