No. 810,786. PATENTED JAN. 23, 1906.

A. MEYER.

GLASS ROLLING APPARATUS.

APPLICATION FILED MAY 15, 1905.

3 SHEETS—SHEET 1.

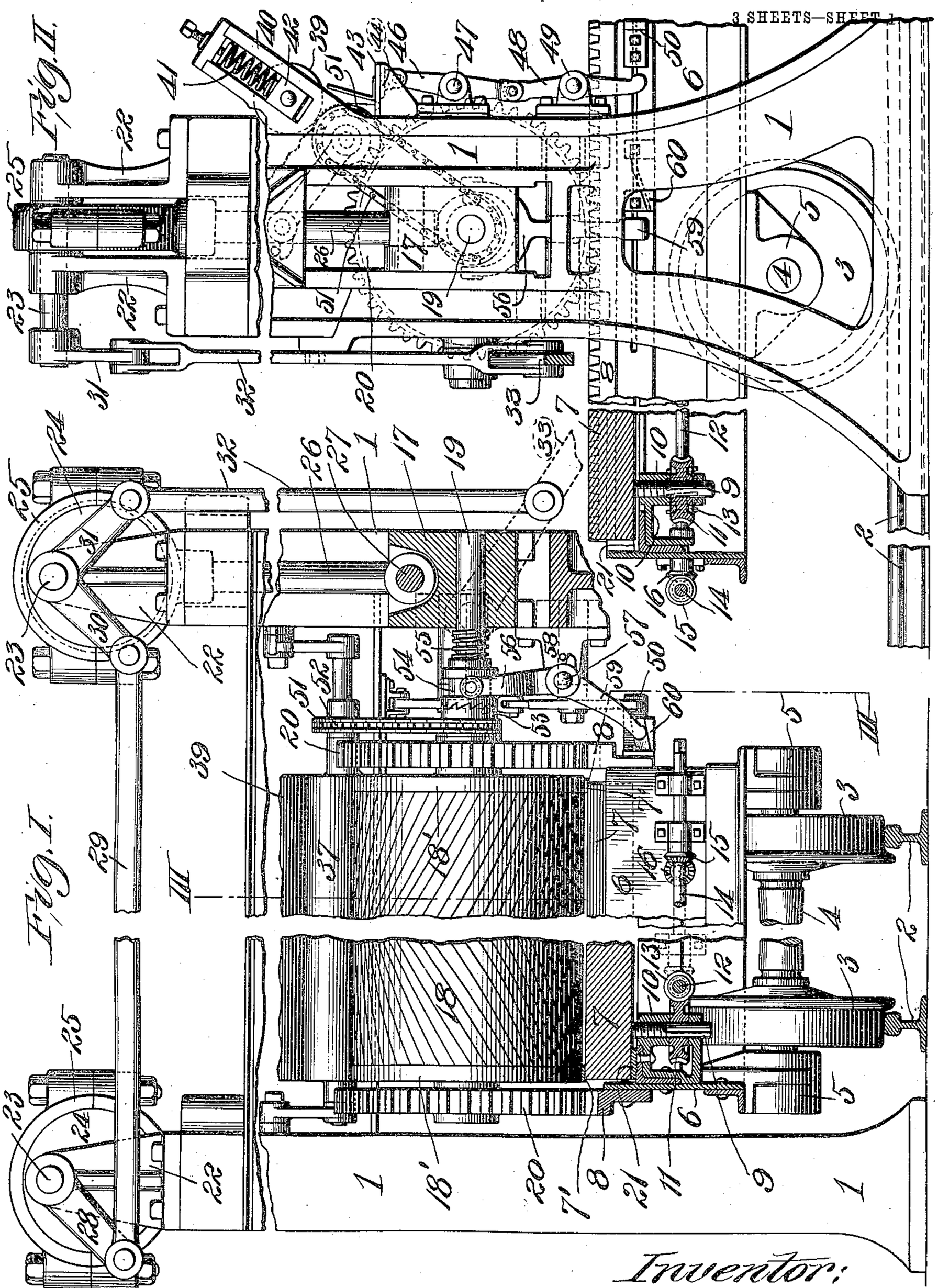

FIG. I.

Attest:
Wm. A. Fett.
Blanche Bryan

Inventor:
Anton Meyer,
by Wright Bros
Attys.

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3 SHEETS—SHEET 2.

Fig. IV.

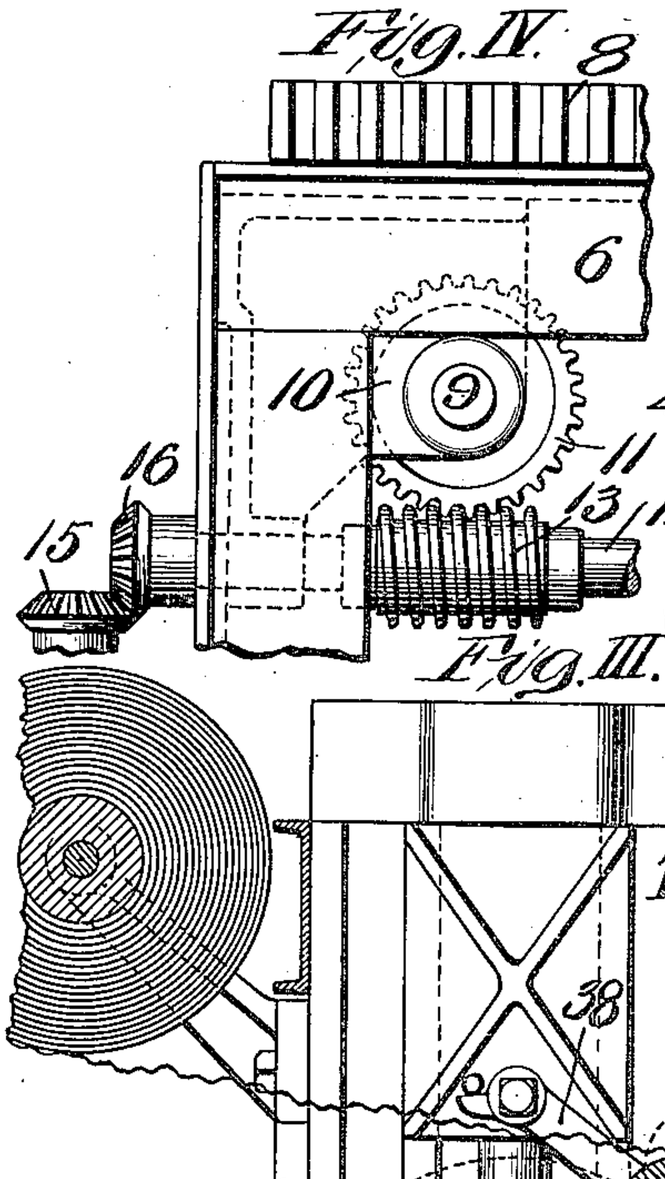


Fig. V.

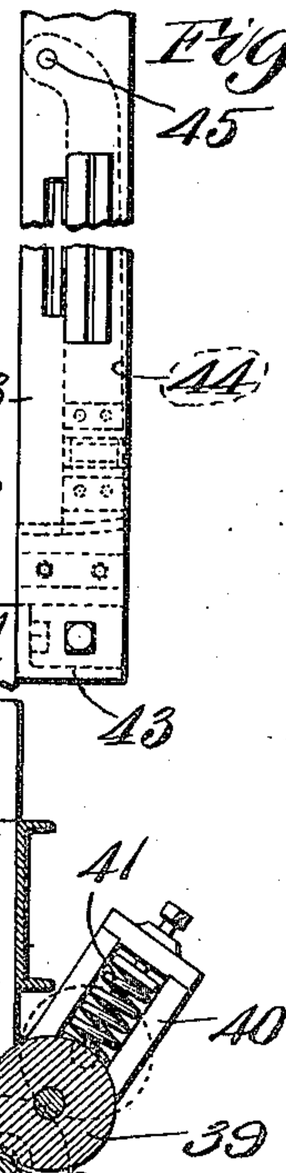


Fig. VI.

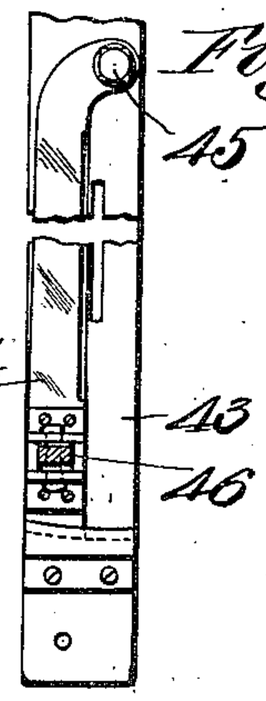
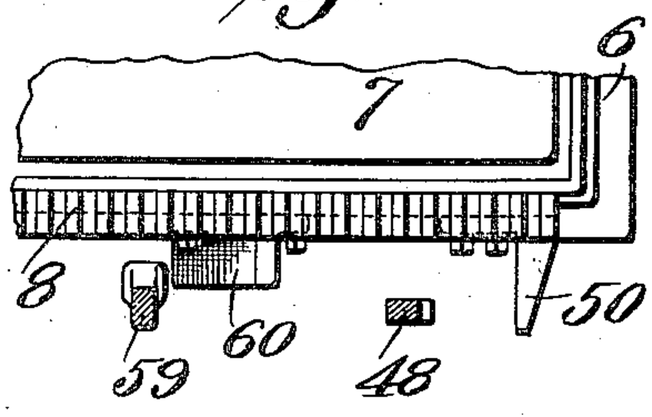
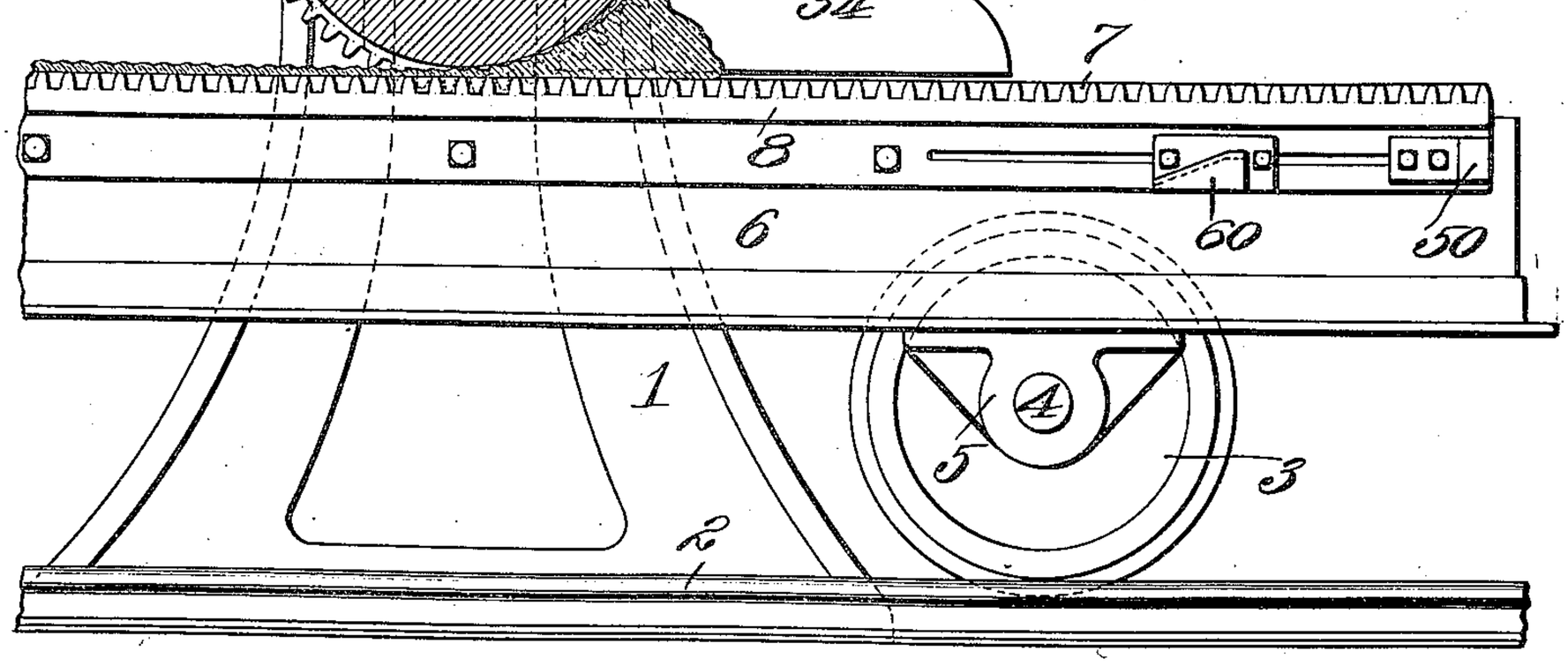


Fig. III.

Fig. VII.





Attest:
Wm. A. Foot.
Blanche Hogan.

Inventor:
Anton Meyer.
By Wright Brt
Attys.

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3 SHEETS—SHEET 3.

Fig. VIII.

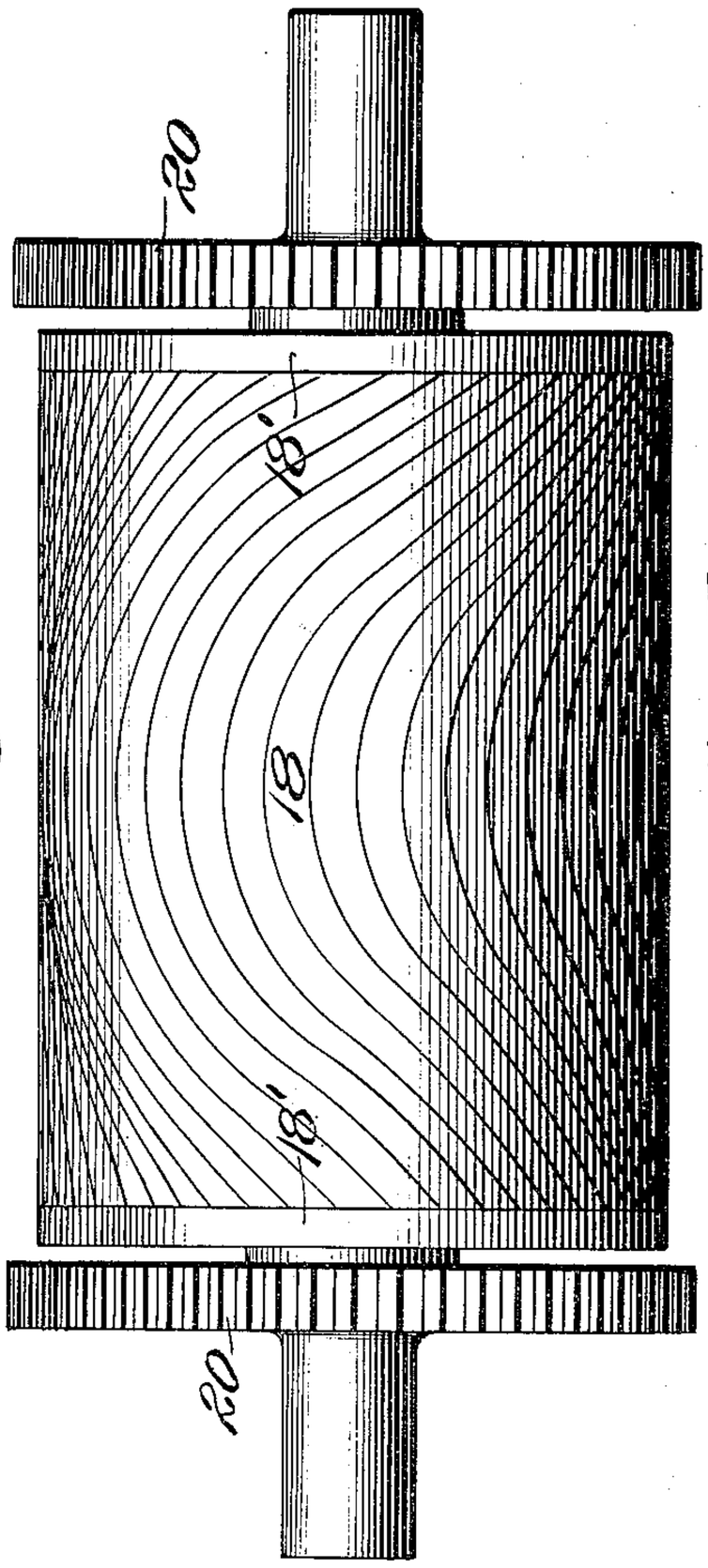


Fig. IX.

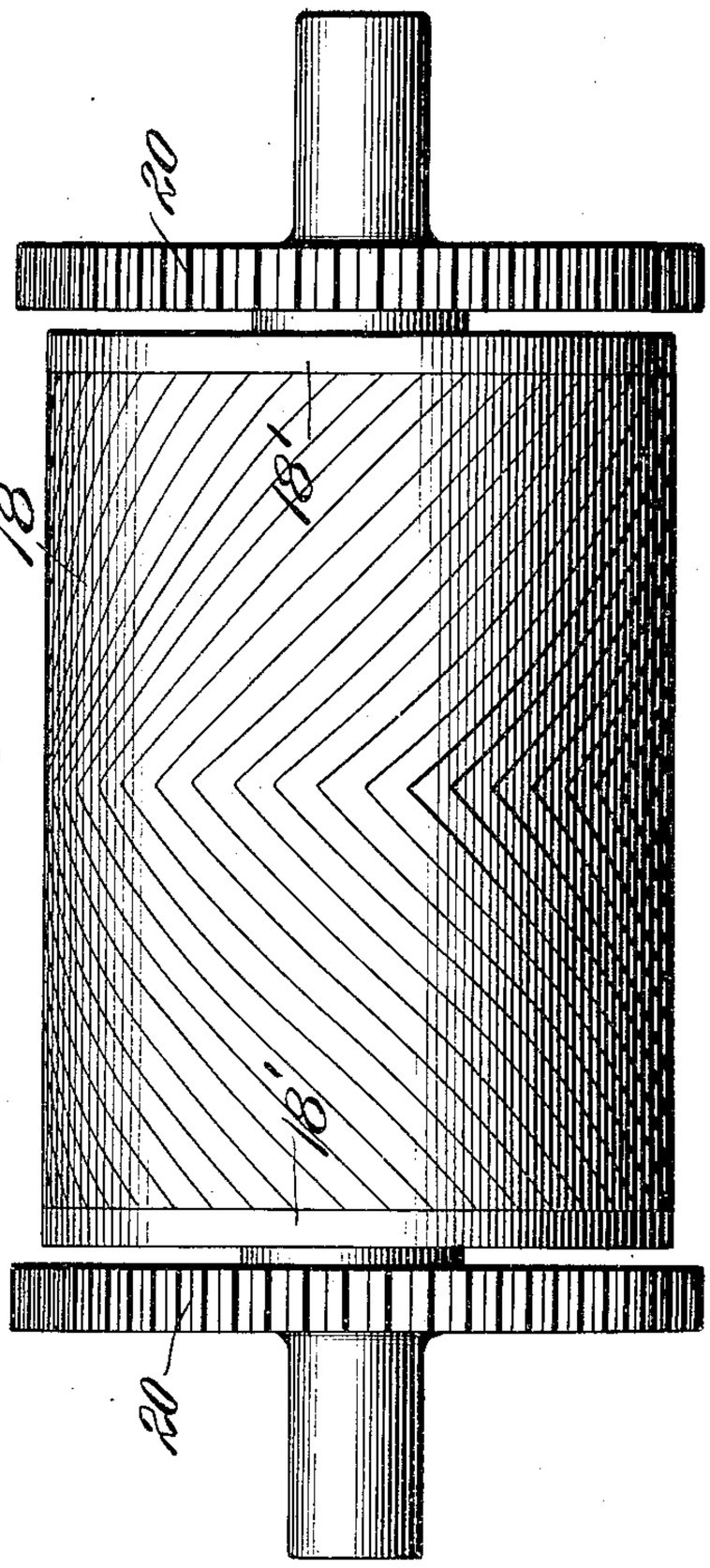
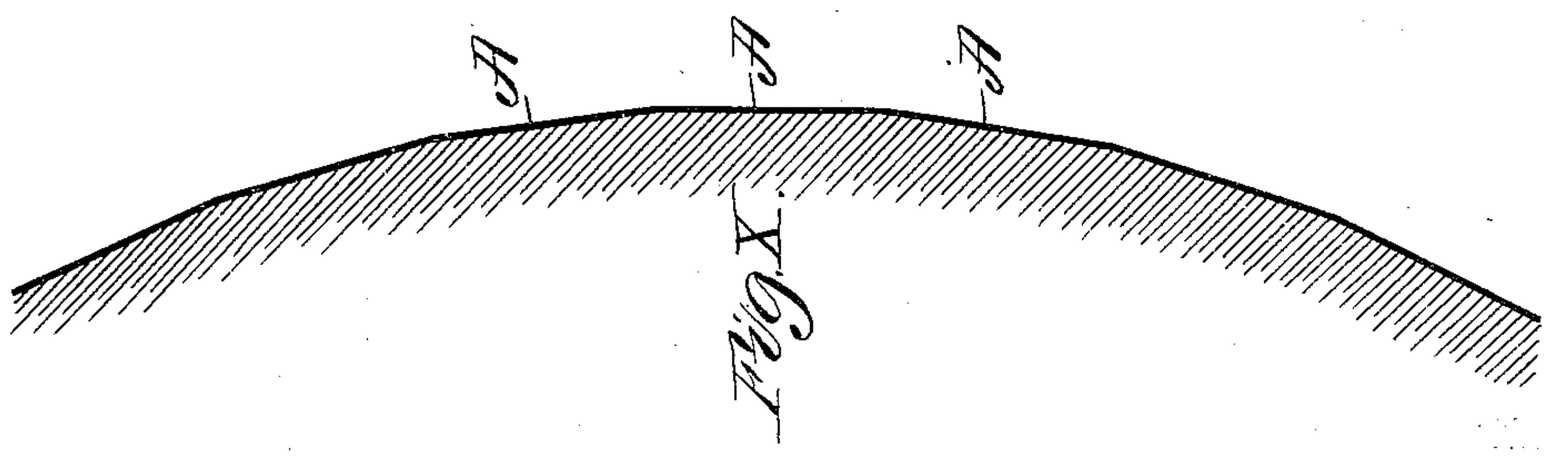


Fig. X.



Witnesses:
Wm. A. Scott
Blanche Hogan

Inventor:
Anton Meyer
by Wright, Brt
attys.

UNITED STATES PATENT OFFICE.

ANTON MEYER, OF ST. LOUIS, MISSOURI.

GLASS-ROLLING APPARATUS.

No. 810,786. Specification of Letters Patent. Patented Jan. 23, 1906.

Application filed May 15, 1905. Serial No. 260,384.

To all whom it may concern:

Be it known that I, ANTON MEYER, a citizen of the United States, residing in the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Glass-Rolling Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an apparatus for rolling sheet-glass, and intended more particularly for use in rolling sheet-glass having layers of wire fabric embedded therein.

Figure I is a view, partly in end elevation and partly in vertical section, of my apparatus, partially broken out. Fig. II is a side elevation of the parts shown in Fig. I with portions of the apparatus shown in vertical section. Fig. III is a view, partly in elevation and partly in vertical section, taken on line III III, Fig. I. Fig. IV is a top or plan view of a portion of the table-frame of the apparatus and the means for elevating the table. Fig. V is a top or plan view, partly broken out and partly broken away, of the wire-fabric-cutting members of my apparatus. Fig. VI is a bottom view of the parts shown in Fig. V. Fig. VII is a top or plan view of one of the corners of the table-frame and table and showing in connection therewith in section the trip-levers by which the wire-fabric-cutting knife and the clutch controlling the actuation of the wire-fabric-starting rollers are actuated. Fig. VIII is an enlarged view of one of the glass-rolling rolls of my apparatus. Fig. IX is a view of a modification of the glass-rolling rolls. Fig. X is an enlarged section of the face of one of the glass-rolling rolls.

1 designates a series of standards which are arranged in pairs at the sides of my apparatus and which may be suitably tied to each other. Each of the standards is bifurcated at its upper end, as seen most clearly in Figs. I and II.

Extending longitudinally through the apparatus and between the standards 1 are track-rails 2, which serve to direct the travel of a carriage on the table of which is placed the glass to be rolled. This carriage consists of truck-wheels 3, having axles 4 mounted therein; journal-boxes 5, in which said axles are mounted; a table-frame 6, supported by said journal-boxes, and a table 7, loosely surmounting said table-frame. At the sides of the table-frame are rack-bars 8, the utility of which will be hereinafter stated.

The table 7 is adapted to receive the glass to be rolled into sheets, and it is susceptible of being raised and lowered to vary its elevation through the medium of the following mechanism:

9 represents lift-screws which are tapped into boxes 10, carried by the table-frame 6, (see Figs. I, II, and IV,) and the upper ends of which are positioned beneath the vertically-movable table 7. The lift-screws 9 pass loosely through worm-wheels 11, that are mounted in the boxes 10 and which are connected to the lift-screws by splines, as seen in Fig. I, so that the lift-screws may move vertically therein, but are compelled to partake of the rotation imparted to the worm-wheels. By this arrangement I provide for the vertical movement of the lift-screws beneath the carriage-table to raise and lower said table when the worm-wheels are rotated. For the purpose of imparting rotation to the worm-wheels I utilize shafts 12, extending longitudinally of the carriage and equipped with worms 13, that mesh with the worm-wheels, and transversely-extending shafts 14, which are provided with bevel-pinions 15, that mesh with bevel-pinions 16, fixed to the longitudinal shafts. The transverse shafts 14 are adapted to be rotated through the medium of a wrench, crank, or other implement applied thereto for the purpose of imparting rotation to the longitudinal shafts and actuating the worms 13 for the purpose of rotating the worm-wheels and lift-screws 9.

17 designates slidable boxes loosely mounted in the bifurcated upper ends of the standards 1 and adapted to be raised and lowered therein for a purpose to be hereinafter mentioned.

18 is one of a series of glass-rolling rolls utilized in my apparatus, these rolls being of a number corresponding to the number of pairs of standards 1. Each of the rolls 18 is supported by a shaft 19, the ends of which are mounted in the journal-boxes 17 of the corresponding pair of standards. At each end of each roll 18 is a spur-wheel 20, that is adapted to mesh with the teeth of the carriage-carried rack 8, located beneath it, thereby providing for the rotation of said rolls through the medium of the rack and spur-wheels when the table-carrying carriage is moved to and fro beneath the rolls, whereby

the glass is rolled upon the carriage-table during the reciprocation of the carriage. It is for the purpose of varying the thickness of the glass to be rolled that I mount beneath the table 7 the lift-screws 9, by means of which the table may be raised and lowered to any desired degree to make sheets of glass of varying thicknesses, according to the elevation of the table and the separation thereof from the rolls 18. To readily gain the desired elevation of the table, I place beneath it removable gage-strips 21, (see Fig. I,) which rest upon the carriage-frame 6. These gage-strips are introduced beneath the table after it has been raised by the lift-screws, and when the table is again lowered it descends onto said gage-plates and they serve as supporting members to relieve the lift-screws of strain. 7′ represents rider or gage strips removably mounted on the table 7 and serving to hold the rolls 18 elevated from the table. The strips receive the flattened end portions 18′ of the rolls.

It is highly desirable in wire-glass-rolling apparatus to use three or more rolls in order that when one of the rolls becomes excessively heated in use it may be elevated to cool while the other rolls are in service. For the purpose of so raising either of the rolls I mount their shafts in the vertically-movable journal-boxes 17 and furnish means for elevating said journal-boxes. This elevating means in the present machine is constructed as follows: 22 represents brackets seated upon the standards 1 at their upper ends and having journaled therein shafts 23, that are provided with eccentrics 24. These eccentrics are surrounded by straps 25, from which depend lift-rods 26, that are pivoted at 27 to the journal-boxes 17. Fixed to each eccentric-shaft 23 at one side of the apparatus is a crank-arm 28, that has pivoted to it a connecting-rod 29, and fixed to each eccentric-shaft at the opposite end of the apparatus is a bell-crank consisting of arms 30 and 31, to the former of which said connecting-rod is pivoted. 32 is a throw-rod pivoted to the bell-crank arm 31 and extending downwardly therefrom into connection with a lever 33, by which said throw-rod is operated. It will be seen that when said lever is raised and lowered said throw-rod acts to rock said bell-crank and oscillate the eccentrics 24 to raise and lower the journal-boxes 17 and the rolls 18, as may be desired. 34 represents guard-plates that are mounted adjacent to the ends of the rolls 18 and serve to restrict the outward spread of the glass while it is being rolled upon the carriage-table. These plates support a lower guide 35 and a pair of upper guides 36, all of which are located in proximity to the roll 18 at the end of the apparatus at which the wire fabric is conveyed downwardly around said roll to be embedded in the glass being rolled, as seen in Fig. III.

37 designates a guide-roller which is supported at an elevation above the guides 36 and which is mounted out of contact with the roll 18 beneath it. This guide-roller is preferably supported by a pair of arms 38, pivoted to the standards 1 of the machine, between which said roller is mounted, suitable stops being provided to limit the downward swing of said arms. The wire-cloth to be embedded in the sheets of glass being rolled is conducted over the guide-roller and passes therefrom downwardly between the guides 36 and between the guide 35 and the glass-rolling roll.

39 is a pressure-roller surmounting the guide-roller 37. The pressure-roller is mounted in guideways 40 and is yieldingly held projected toward the guide-roller by springs 41, mounted in said guideways and bearing against boxes 42, in which the spindles of the pressure-roller are journaled. The guide-roller and pressure-roller serve in conjunction with each other as wire-fabric-straightening members between which the wire fabric is drawn as it is fed into the molten glass placed upon the carriage-table of the apparatus.

43 designates a slotted plate supported adjacent to the guide-roller 37 and through which the wire fabric passes after traveling over said roller. Beneath the slotted plate is a knife 44, that is pivoted at one end to the plate at 45, (see Figs. V and VI,) and which is adapted to swing to and fro across the slot in the plate for the purpose of severing the wire-cloth after a sufficient quantity thereof has passed over the guide-roller 37 to meet the requirement for the sheet of glass being rolled. The knife 44, is rocked to and fro to shear the wire fabric through the medium of a rocker 46, having its upper end pivoted to said knife. (See Fig. II.) This rocker is pivotally connected to the adjacent standard 1 at 47, and it has connected to its lower end a lever 48, that is pivoted at 49 to the standard 1, just referred to. The lower end of the lever 48 extends downwardly to the side of the carriage-frame 6 and occupies a position in the path of travel of a trip-block 50, adjustably secured to said carriage-frame. (See Figs. I, II, III, and VII.) This trip-block is located adjacent to the lower end of the carriage-frame, and therefore it acts to trip the lever 48 for the operation of the knife 44 when the carriage has made nearly a complete forward movement while the sheet of glass is being rolled thereupon and the wire fabric is being embedded in the glass.

The guide-roller 37 is driven through the medium of a drive-chain 51, that operates upon a toothed wheel 52, fixed to the shaft of said roller and which leads to a clutch member 53, loosely mounted upon the shaft of the glass-rolling roll 18. (See Fig. I.) The clutch member 53 is opposed by a clutch-collar 54,

slidably keyed to the roll-shaft and backed by a spring 55, that serves to press said clutch-collar toward said clutch member 53. The clutch-collar 54 serves to drive the clutch member 53 and causes said member to drive the guide-roller 37 for the delivery of the wire fabric between said guide-roller and the pressure-roller 39. It is therefore necessary that when the wire fabric is severed after the desired quantity has been fed forward for a sheet of glass that the actuation of said guide-roller cease. To provide for such cessation, I associate with the clutch-collar 54 a lever 56, that is pivoted at 57 to a bracket 58, supported by one of the standards 1. The lever 56 has a downwardly-extending arm 59, which projects into a position alongside of the carriage-frame 6 and is in the path of travel of an inclined trip-block 60, adjustably secured to said frame. When in the operation of the machine the trip-block 60 moves into engagement with the lever-arm 59, said lever-arm is rocked upwardly and inwardly, thereby causing the lever 56 to shift the clutch-collar 54 away from the clutch member 53 in order that said clutch member will be no longer rotated, and therefore the guide-roller 37 will be brought to rest and delivery of wire fabric thereover cease.

It is to be noted that by mounting the trip-blocks 50 and 60 adjustably upon the carriage-frame of the apparatus these trip-blocks may be shifted to and fro. The object of this is to provide for the severing of the wire fabric at the proper time and the cessation of feed of the wire fabric over the guide-roller 37 after the sheet of glass with the wire fabric therein has been rolled without feeding an excessive quantity of the fabric.

The glass-rolling rolls of my apparatus are peculiarly constructed for the purpose of producing absolutely flat and even surfaces upon the sheets of glass rolled thereby and avoiding the waving surface, such as commonly exists in sheet-glass having wire fabric embedded therein. By "waving" surface I mean a surface in which ridges are present extending longitudinally of the table of the glass-rolling apparatus at the surface of the glass rolled thereon. These ridges in the glass are produced by uneven cooling in the sheet of glass when rolled with the glass in molten condition, and in the use of plain rolls it has been found impossible to avoid the occurrence of the ridges. It is one of the main objects of my present improvement to avoid the occurrence of the ridges referred to by the use of rolls that will act constantly throughout their rolling action to force the molten glass outwardly from the center of the plate, thus carrying the glass at the plate's center to its sides before the molten glass at the sides becomes sufficiently cooled to prevent the central portion of the mass from being forced outwardly by the rolls to the side portions. To this end the rolls are convoluted or fluted in lines that are obliquely or approximately obliquely disposed relative to the axes of the rolls, as seen in Figs. I, VIII, and X. These convolutions are preferably in the form of compound curves extending longitudinally of the rolls, as seen most clearly in Fig. VIII; but they may be of angle form, as seen in Fig. IX, with the crowns of each convolution located at approximately the longitudinal center of the roll. The convolutions of the rolls are of flattened form, as seen at A, Fig. X, thereby making the perimeter of each roll polygonal in form. The result of using a convoluted roll and making the roll polygonal at the periphery and having the convolutions extending in waving lines with respect to the axes of the rolls is that of causing the glass acted upon by the rolls to be spread outward in various courses instead of its being merely flattened out. As a consequence a plate-surface at the top of the glass sheet is secured instead of producing the waving condition of the sheet which results from the use of only plain cylindrical rolls.

Where it is desired to produce an absolutely smooth surface upon the glass sheet rolled in my apparatus, a plain cylindrical roll may be used in the apparatus in a position to operate upon the glass sheet and roll it smooth after it has been flattened out by the convoluted roll preceding it in operation.

I claim as my invention—

1. In a glass-rolling apparatus, the combination of a carriage provided with a table, a series of rolls arranged to be geared to said carriage, vertically-movable journal-boxes in which said rolls are journaled, lift-rods connected to said journal-boxes, eccentrics fitted to said lift-rods, and means for operating said eccentrics to move said lift-rods; said operating means consisting of a crank-arm fixed to one of said eccentrics, a bell-crank fixed to the other eccentric, a connecting-rod uniting said crank-arm and bell-crank, a throw-rod connected to said bell-crank, and a lever for actuating said throw-rod, substantially as set forth.

2. In a glass-rolling apparatus, the combination of a carriage, a roll surmounting said carriage, means for delivering wire fabric to said carriage past said roll, a slotted bar located adjacent to said roll, a knife associated with said slotted bar, and means for actuating said knife to sever the wire fabric passing through said slotted bar, substantially as set forth.

3. In a glass-rolling apparatus, the combination of a carriage, a roll surmounting said carriage, means for delivering wire fabric to said carriage past said roll, a slotted bar located adjacent to said roll, a knife associated with said slotted bar, and means actuated through the medium of said carriage for operating said knife to sever the wire fabric

passing through said slotted bar, substantially as set forth.

4. In a glass-rolling apparatus, the combination of a carriage, a roll surmounting said carriage, means for delivering wire fabric to said carriage past said roll, a slotted bar located adjacent to said roll, a knife associated with said slotted bar, a lever connected to said knife, and a trip-block carried by said carriage and adapted to engage said lever, substantially as set forth.

5. In a glass-rolling apparatus, the combination of a carriage, a roll surmounting said carriage, means for delivering wire fabric to said carriage past said roll, a slotted bar located adjacent to said roll, a knife associated with said slotted bar, a lever connected to said knife, and a trip-block adjustably secured to said carriage and arranged to engage said lever, substantially as set forth.

6. In a glass-rolling apparatus, the combination of a carriage, a roll surmounting said carriage, guiding and feed rollers located in proximity to said roll for feeding wire fabric onto said carriage, a clutch member loosely associated with said roll, and geared to one of said rollers, a clutch on the shaft of said roll opposing said clutch member, and means actuated through the medium of said carriage for freeing said clutch from said clutch member, substantially as set forth.

7. In a glass-rolling apparatus, the combination of a carriage, a roll surmounting said carriage, guiding and feed rollers located in proximity to said roll for feeding wire fabric onto said carriage, a clutch member loosely associated with said roll and geared to one of said rollers, a clutch on the shaft of said roll opposing said clutch member, a lever fitted to said clutch, and means carried by said carriage for actuating said lever to shift said clutch, substantially as set forth.

8. In a glass-rolling apparatus, the combination of a carriage, a roll surmounting said carriage, guiding and feed rollers located in proximity to said roll for feeding wire onto said carriage, a clutch member loosely associated with said roll, and geared to one of said rollers, a clutch on the shaft of said roll opposing said clutch member, a shift-lever fitted to said clutch and a trip-block carried by said carriage and arranged to trip said lever, substantially as set forth.

9. In a glass-rolling apparatus, the combination of a carriage, a roll surmounting said carriage, guiding and feed rollers located in proximity to said roll for feeding wire fabric onto said carriage, a clutch member loosely associated with said roll and geared to one of said rollers, a clutch on the shaft of said roll opposing said clutch member, a lever fitted to said clutch and a trip-block adjustably secured to said carriage and arranged to trip said lever, substantially as set forth.

10. In a glass-rolling apparatus, the combination of a carriage provided with a table, and a roll surmounting said carriage; said roll being convoluted and having a polygonal perimeter, substantially as set forth.

11. In a glass-rolling apparatus, the combination of a carriage provided with a table, and a roll surmounting said carriage; said roll being provided with convolutions disposed obliquely relative to the axis of the roll, substantially as set forth.

12. In a glass-rolling apparatus, the combination of a carriage provided with a table, a roll surmounting said carriage; said roll having its periphery provided with convolutions extending in compound curves, substantially as set forth.

13. In a glass-rolling apparatus, the combination of a carriage provided with a table; a roll surmounting said carriage; said roll having its periphery provided with convolutions extending in compound curves and said convolutions being flattened to provide the roll with a polygonal periphery, substantially as set forth.

ANTON MEYER.

In presence of—
NELLIE V. ALEXANDER,
WM. H. SCOTT.