

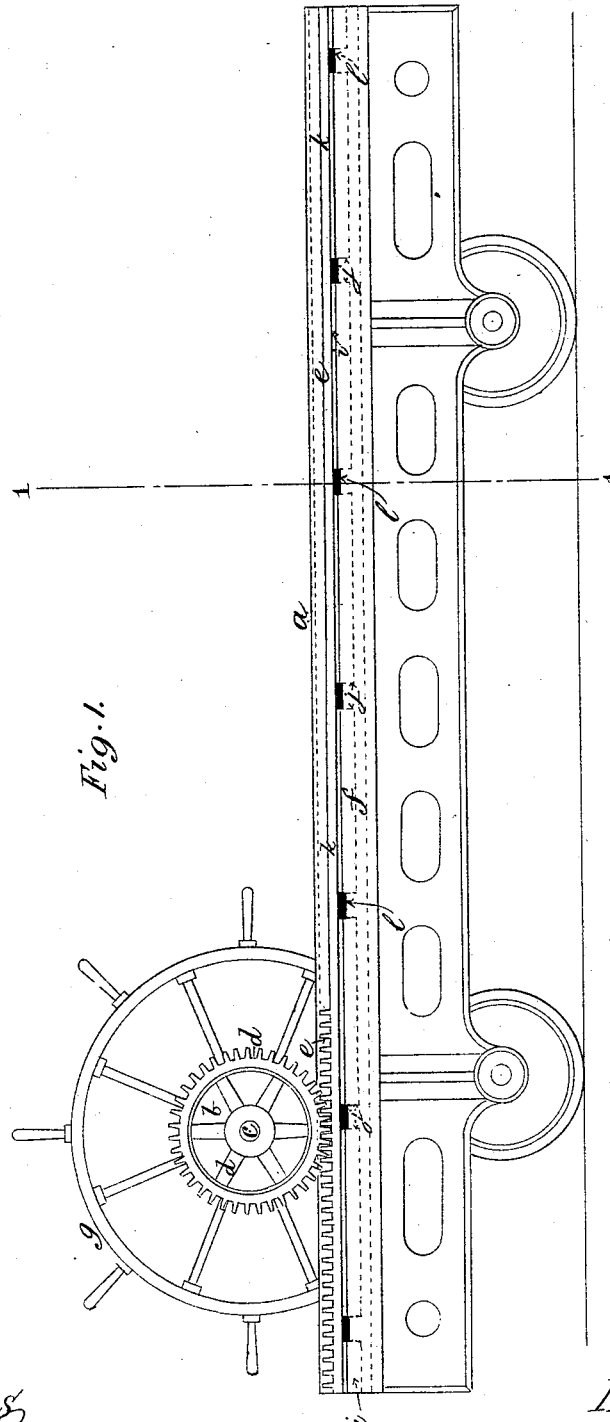
(No Model.)

4 Sheets—Sheet 1.

E. WALSH, Jr.  
ART OF ROLLING PLATE GLASS.

No. 346,695.

Patented Aug. 3, 1886.



WITNESSES  
Edward L. Fennell.  
Joseph W. Crookes.

INVENTOR  
Edward Walsh Jr.  
Paul Bakerwell  
his attorney

(No Model.)

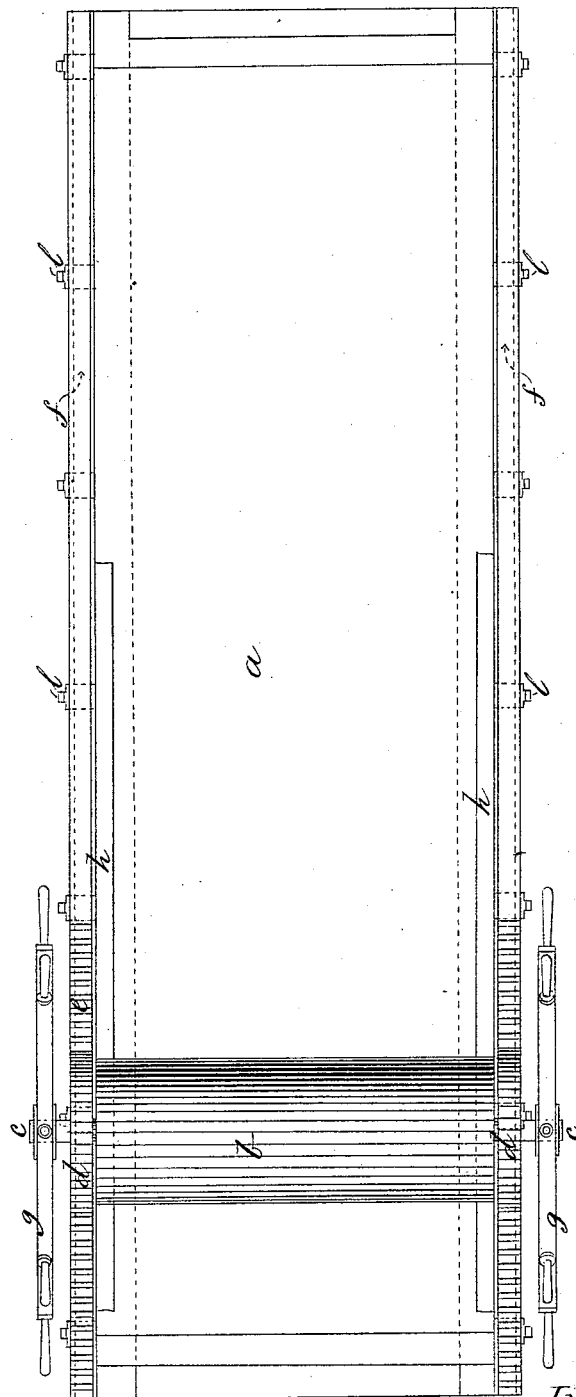
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Fig. 2.



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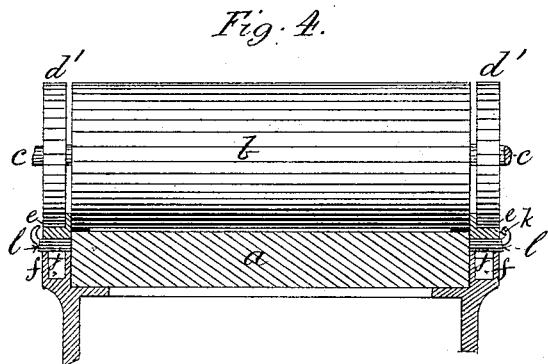
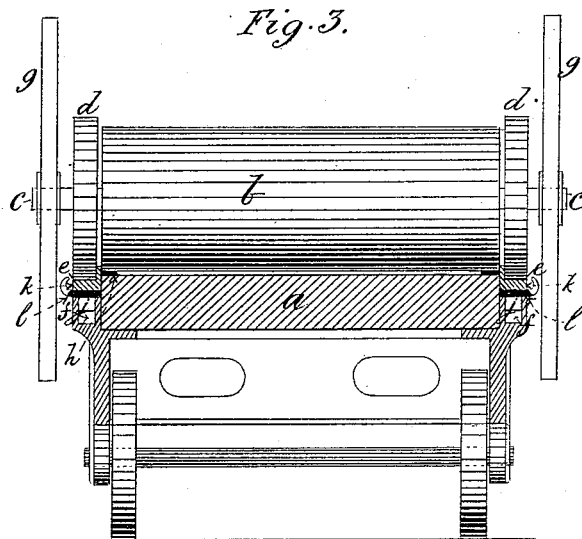
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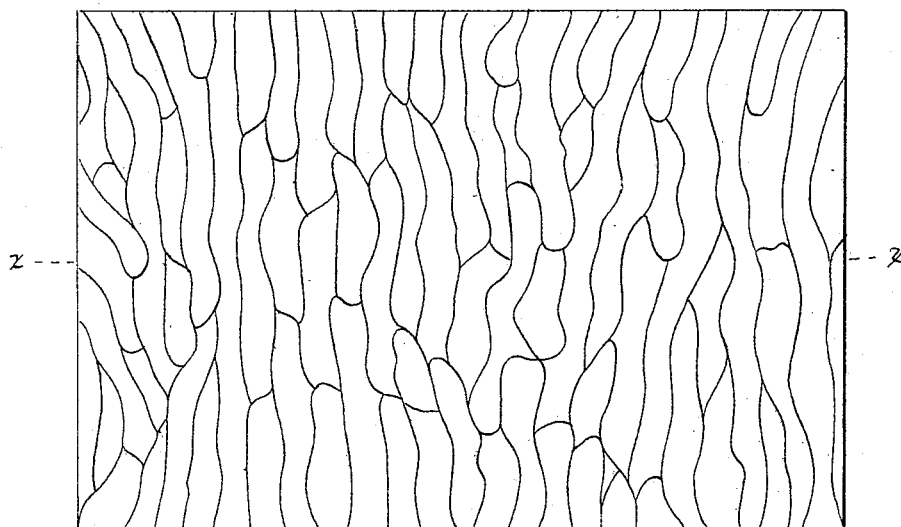
4 Sheets—Sheet 4.

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*Fig. 5*



*Fig. 6*



Witnesses

*L. G. Smith, Jr.*  
*I. A. Lewis.*

Inventor

*Edward Walsh Jr.*

By *his Attorney*

*James H. Bakewell*

# UNITED STATES PATENT OFFICE.

EDWARD WALSH, JR., OF ST. LOUIS, MISSOURI.

## ART OF ROLLING PLATE-GLASS.

SPECIFICATION forming part of Letters Patent No. 346,695, dated August 3, 1886.

Application filed February 10, 1886. Serial No. 191,399. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD WALSH, JR., a citizen of the United States, residing in the city of St. Louis, State of Missouri, have invented new and useful Improvements in the Art of Rolling Plate-Glass, of which the following is a full, clear, and exact description.

My invention relates to an improvement in the art of producing on plate-glass an ondoyant surface; and it consists in forming this surface on the glass by causing the rolls by which the molten glass is spread into a sheet to have an unequal rotary and longitudinal motion, as hereinafter more fully described.

In ordinary machines for rolling smooth glass the spur-wheels are of the same diameter as the cylindrical roller, by which arrangement the sheet or slab of glass is oftentimes puffy and imperfectly finished on its upper surface, and the toothed side racks being made in sections, which are adjusted vertically by the set-screws, it is tedious and difficult to bring the racks to a proper level for producing a uniform thickness of glass.

In the accompanying sheets of drawings, Figure 1, Sheet 1, is a side elevation representing a glass-rolling machine constructed according to my invention; Fig. 2, Sheet 2, a plan thereof; Fig. 3, Sheet 3, a transverse section on line 1 1 in Fig. 1; and Fig. 4, Sheet 3, a detached sectional elevation, partly broken away, of an alternate arrangement of the machine, like letters of reference denoting like parts in all the figures. Fig. 5, Sheet 4, is a plan view of a slab of my improved ondoyant glass; and Fig. 6 is a sectional view of the same on the line *x x*, Fig. 5.

*a*, Figs. 1, 2, and 3, represents the table of my improved rolling-machine, over which is mounted the cylindrical roller *b*, provided with the spindle *c*, on which is fixed, at each end of the roller *b*, a spur-wheel, *d*, gearing into the toothed rack *e*, which is fitted and capable of vertical adjustment in the groove or channel *f*, formed at each side of the table *a*, and hereinafter more particularly referred to.

*g g* are hand-wheels fixed on the roller-spindle *c*, and *h h* are bars placed upon the table *a*, between the latter and the roller *b*, for gauging or determining the thickness of the sheets or slabs of glass to be rolled.

I make the spur-wheels *d* of larger diameter than the roller *b*, so that, on rotation being imparted to the spindle *c* by the hand-wheels *g g*, the progressive circumferential motion of the spur-wheels *d*, which are constrained by the toothed racks *e*, will exceed the circumferential progressive motion of the roller *b* along the table *a*, the consequence being that the cylindrical surface of the roller *b* will be retarded and drag on the upper surface of the sheet or slab of glass, and in so doing will have the effect of drawing together the particles of the glass or increasing its consistency, and of producing a more thorough planishing or polishing of the surface of the sheet or slab of smooth glass than can be obtained by the ordinary process.

In the apparatus, as represented by Fig. 4, Sheet 3, I make the spur-wheels *d' d'* of smaller diameter than the cylindrical roller *b*, and substitute the same for the spur-wheels *d d* in Figs. 1, 2, and 3. By this arrangement, on motion being imparted to the roller-spindle *c* by the hand-wheels *g*, as before, the progressive circumferential motion of the spur-wheels *d'* will be less than that of the roller *b*, and the periphery of the latter will consequently be accelerated and drag excessively, or slip upon the surface beneath, so as to produce an irregular ondoyant or waved upper surface on the sheet or slab of glass while being rolled. Glass so produced may be used in cathedrals, houses, or other buildings where the free admission of light is desired, and at the same time the observance of objects through the glass prevented. This ondoyant surface is shown in Figs. 5 and 6, and is readily distinguished from what is known as "hammered" glass, as the wave surface is produced by opposing forces, and is consequently irregular, like waves produced by wind on the surface of water having a tide or current.

For vertically adjusting the toothed side racks, *e*, to the varying diameters of the spur-wheels *d d* and *d' d'*, or thickness of the glass to be rolled, each rack *e* is made in one piece or casting, and through its lower web, *i*, are formed transversely slots or openings *j*, across which, between the upper rack-bar, *k*, and the recessed upper edges of the sides of the

groove or channel *f*, are placed keys or wedges *l*, having a uniform thickness throughout the series according to the adjustment required. By this means each rack *e* may be brought to a dead level for its entire length at one operation by raising the same and placing the keys or wedges *l* in position, instead of the tedious and oftentimes inaccurate method of adjusting separately each section of the rack by setting screws, as at present. Any longitudinal movement of the racks *e* is prevented by the keys or wedges *l*, bearing against the ends of their recesses in the edges of the grooves or channels *f*.

15 I claim—

1. In a machine for rolling glass, the combination of a table, a cylindrical roller, and a rack and pinion, the pinion having a greater

or less diameter than the roller, substantially as and for the purposes specified.

2. The herein-described method of forming ondoyant glass, consisting in subjecting the surface of the glass, while in the state of a semi-fluid sheet, to the action of a roller having an unequal rotary and longitudinal motion, substantially as and for the purpose specified.

3. As a new article of manufacture, a plate of glass having a rolled ondoyant surface, substantially as described.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 3d day of February, 1886.

EDWARD WALSH, JR.

Witnesses:

JOS. W. CROOKES,

PAUL BAKEWELL.