(No Model.) 5 Sheets—Sheet 1.

R. A. SCHLEGEL.

MACHINE FOR BEVELING GLASS.

No. 550,695. Patented Dec. 3, 1895.

Fig. 2.

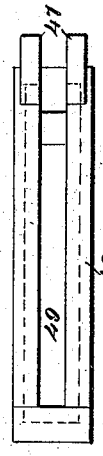

Fig. 1.

Witnesses
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By his Attorneys
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(No Model.)

5 Sheets—Sheet 2.

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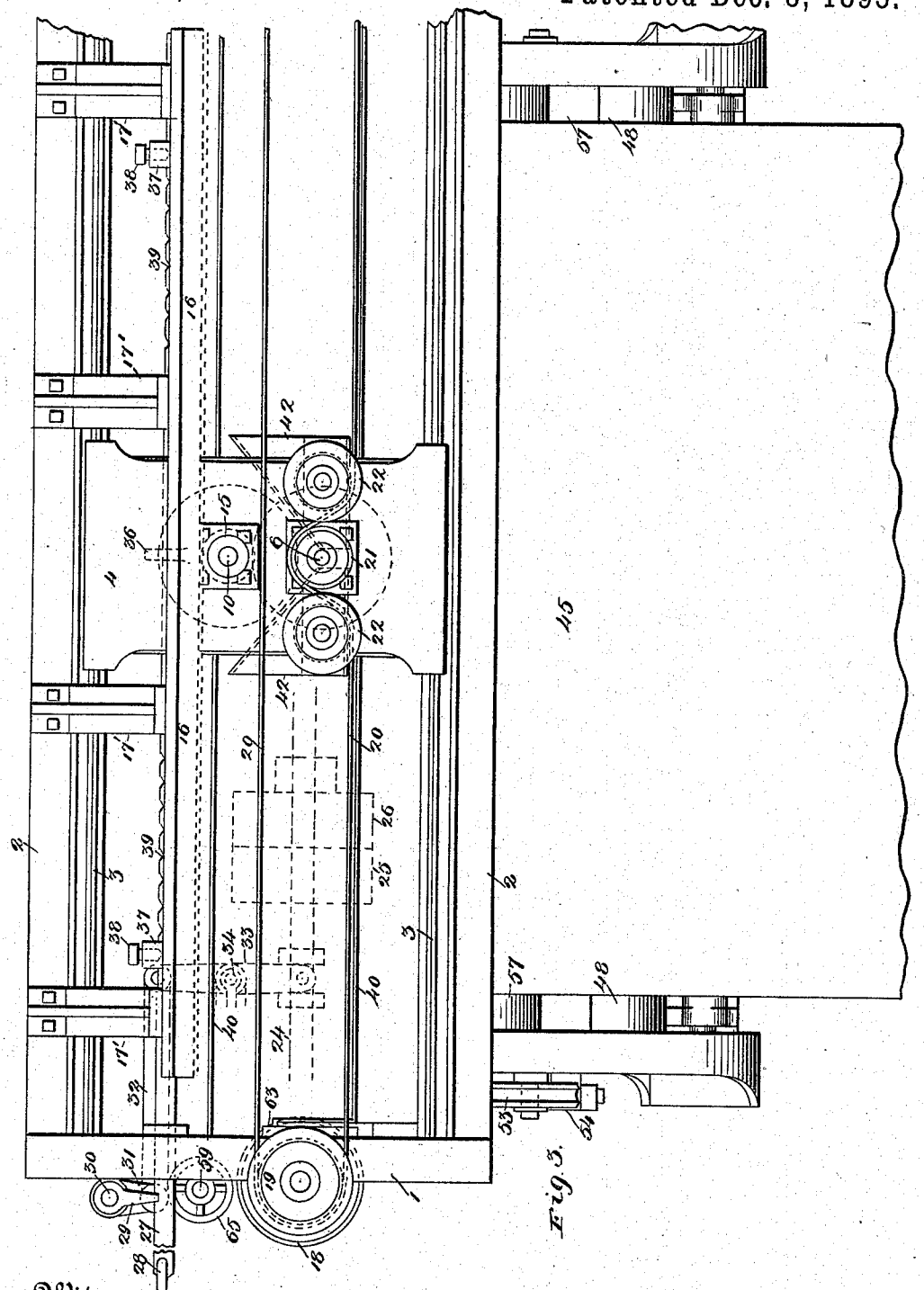

Fig. 3.

Witnesses
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(No Model.) 5 Sheets—Sheet 3.

R. A. SCHLEGEL.

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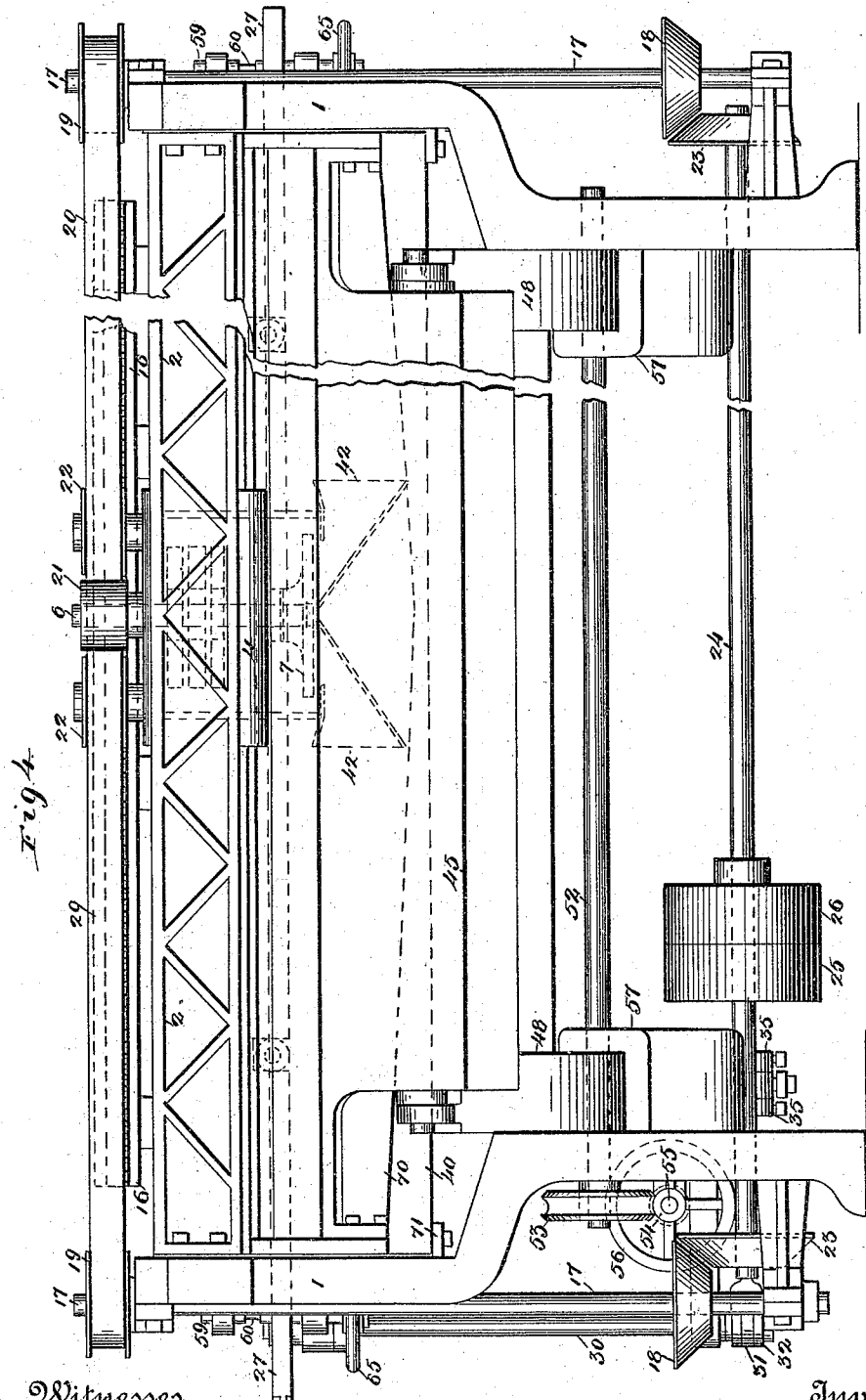

Fig. 4.

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(No Model.) 5 Sheets—Sheet 4.

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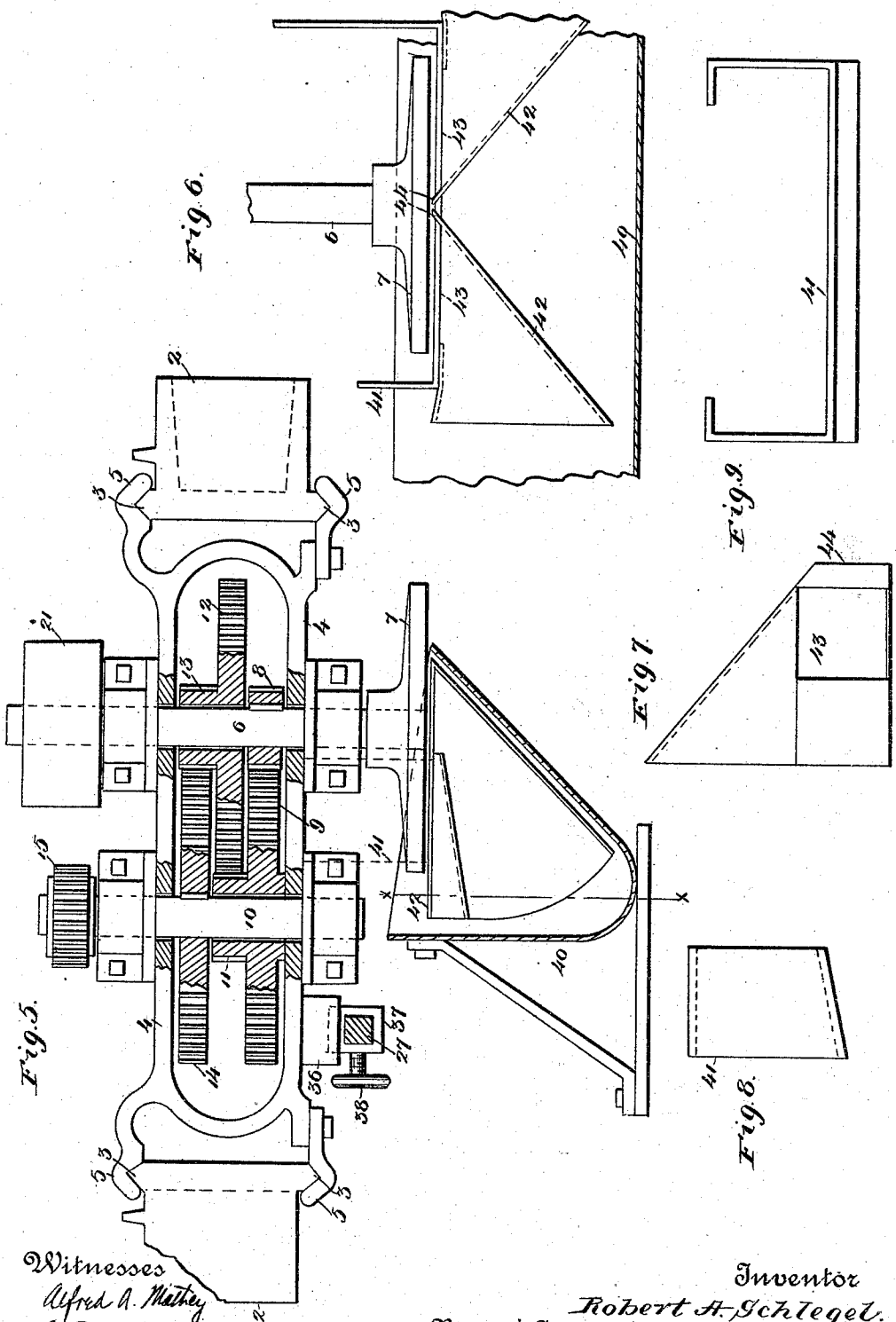

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MACHINE FOR BEVELING GLASS.

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Fig. 11.

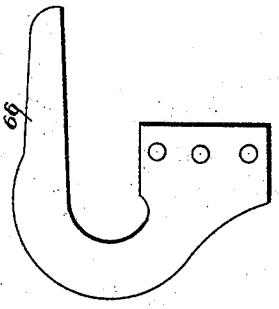


Fig. 13.

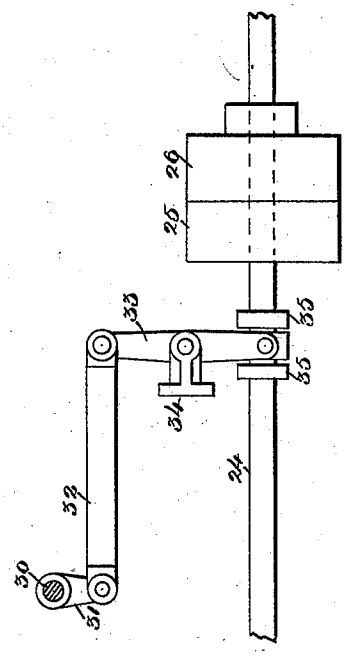


Fig. 10.

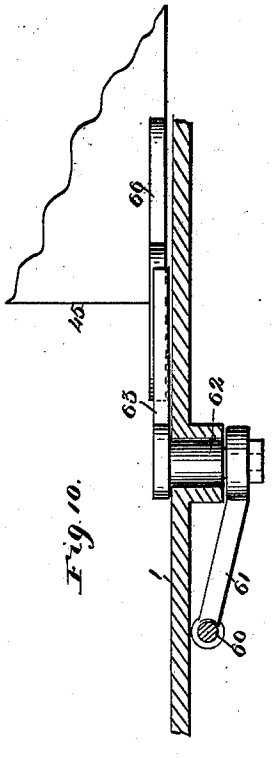
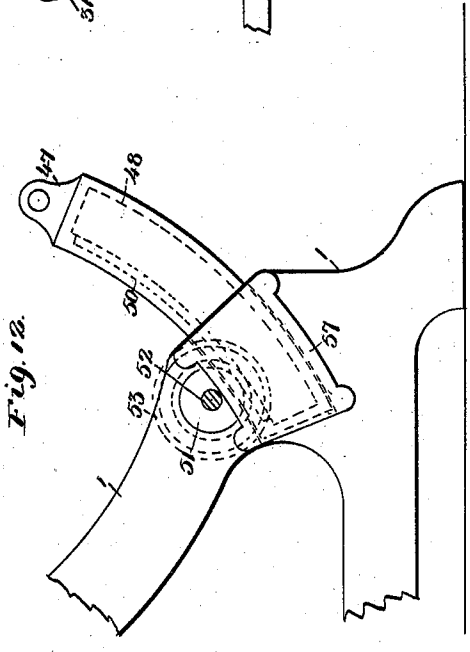


Fig. 12.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR BEVELING GLASS.

SPECIFICATION forming part of Letters Patent No. 550,695, dated December 3, 1895.

Application filed July 5, 1895. Serial No. 554,946. (No model.)

To all whom it may concern:

Be it known that I, ROBERT A. SCHLEGEL, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Machines for Beveling Glass, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in machines for beveling glass; and it consists in the novel arrangement and combination of parts more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a side elevation of my complete invention. Fig. 2 is a top plan view of one of the segmental supporting-arms for the table. Fig. 3 is a top plan view of the machine with one end broken away. Fig. 4 is a front elevation of the invention. Fig. 5 is a vertical middle section of the carriage, showing some parts in elevation, also showing in transverse section the trough with which the grinding-disk of the carriage co-operates. Fig. 6 is a section on line *x x* of Fig. 5. Fig. 7 is a top plan view of the scoop or funnel carried by the carriage. Fig. 8 is a side elevation of the bracket to which the funnels are attached. Fig. 9 is a front view of the bracket. Fig. 10 is a detail vertical section of the levers forming a part of the pitch-adjusting mechanism to be hereinafter referred to. Fig. 11 is a side elevation of one of the terminal shoes carried by the table. Fig. 12 is a detail inside elevation of one of the segmental supporting-arms and the boxing within which the lower end thereof operates, and Fig. 13 is a detail plan view of the levers constituting a part of the reversing mechanism.

The object of my invention is to construct a glass-beveling machine by which plates of any dimensions can be readily handled and controlled; one in which the plates will be firmly supported at all points of their surface during the beveling operation, thereby resulting in an even distribution of the strain to which the plate may be subjected, and thus preventing accidental breakage or cracking; one by which the plate is automatically fed to or kept in contact with the grinding-disk; one in which the grinding material is automatically fed to the grinding-disk during the operation of the latter; one in which the angle of the bevel can be readily adjusted, and one presenting further and other advantages to be hereinafter more fully described.

In general the machine consists of a suitable frame, of a pivoted or tilting table carried by said frame, of means for raising and lowering the pivotal line of said table, of means for controlling the angle or pitch of the table and consequently the pitch of the edge of the plate-glass carried thereby, of a suitable carriage carrying a rotating grinding-disk for operating against the edge of the glass plate, of suitable mechanism for rotating the grinding-disk and impelling the carriage, of suitable reversing mechanism controlled by the movement of the carriage, of suitable scoops or funnels for gathering and feeding the grinding material to the rotating disk, and of other and further details to be hereinafter more specifically pointed out and claimed.

Referring to the drawings, 1 represents the terminal supporting-standards of the frame of the machine, the same being connected at their upper ends by the longitudinal beams 2 2, the inner faces of each of which are provided at their lower and upper edges with the bevel-tracks or guideways 3 3, over which is adapted to reciprocate or ride the transverse tool-carriage 4, having terminal arms 5 embracing the bevel-tracks above referred to. Vertically mounted in suitable bearings of said carriage is the grinding-disk shaft 6, whose lower end carries a grinding-disk 7. Keyed to the shaft 6 within the housing formed by the framework of the carriage is a pinion 8, which meshes with the teeth of a large gear-wheel 9, loosely revolving or passed over a second shaft 10, mounted in the carriage parallel to the disk-shaft, the said gear-wheel 9 having formed integral therewith a pinion 11, which in turn meshes with the teeth of a large gear-wheel 12, carried loosely on the shaft 6. The gear-wheel 12 has formed integral therewith a pinion 13, which meshes with the teeth of a large gear-wheel 14, keyed to the shaft 10. By this system of differential gearing a rapid rotation imparted to the shaft 6 is transformed into a comparatively slow one when it reaches the shaft 10. The upper end of the shaft 10 carries a pinion 15,

which meshes with a rack-bar 16, carried by the free ends of the arms 17', mounted on one of the longitudinal beams 2. It is apparent, therefore, that as rapid rotation is imparted to the disk-shaft 6 the carriage 4, in which said shaft is mounted, is caused to travel slowly along the tracks 3, being impelled along said tracks by the pinion 15, meshing with the rack-bar 16. Inasmuch as the edge of the glass to be beveled must be swept over by the grinding-disk 7 several times before the beveling of the same is completed, it is apparent that some provision must be made for reciprocating the carriage back and forth in the path of the edge of said glass to be beveled and to reverse the direction of rotation of the grinding-disk with each reciprocation.

It is apparent from the foregoing gear construction that if the grinding-disk be reversed at the end of each stroke of the carriage this action would reverse the direction of rotation of the pinion15 and cause the carriage to travel or reciprocate in the opposite direction. It is therefore essential to provide the necessary mechanism for reversing the rotation of the grinding-disk 7 at the end of each stroke of the carriage carrying said disk. This is accomplished by suitable reversing mechanism co-operating with the mechanism which imparts motion to the disk-shaft 6 and which jointly co-operate as follows:

Mounted vertically in suitable bearings at the opposite ends of the frame of the machine are the shafts 17, their lower ends carrying bevel friction gear-wheels 18, and their upper ends being provided with the flanged belt-pulleys 19, over which is stretched the drive-belt 20, one of the laps of said belt passing between the pulley 21, carried at the upper end of the disk-shaft 6, and the idle-pulleys 22 revolving in suitable bearings in the carriage-frame. The friction between the belt-lap and the pulleys is sufficient during the travel of the belt to impart rotation to the pulley 21, and consequently to the disk-shaft 6, the direction of rotation of said shaft and consequent direction of rectilinear travel of the carriage depending, of course, on the direction in which the belt is driven. The belt is driven first one way and then the other by the following mechanism: It has been stated that the lower end of each shaft 17 carries a bevel friction gear-wheel 18. Now each of these bevel-wheels 18 alternately are brought into engagement with a terminal friction bevel gear-wheel 23, carried at opposite ends of the main drive-shaft 24, provided with fast and loose pulleys 25 and 26, respectively, said shaft 24 being susceptible of a slight longitudinal reciprocating motion in its bearings, a motion which will be just sufficient to bring into engagement with the bevel-wheel 18 first one of the terminal bevel-wheels 23 at one end and then bring the corresponding parts into engagement at the opposite end of the machine. It is obvious that this alternate engagement and disengagement of the friction-bevels 23 and 18 will set into motion in one direction first one of the shafts 17 and then the other in a reverse direction, and these actions in turn will cause the drive-belt to travel and the grinding-disk to rotate first in one direction and impel the carriage 4 along its tracks in one direction, and then to reverse the motion of these several parts and cause the carriage to reciprocate in the opposite direction.

The mechanism by which the rotating drive-shaft 24 is automatically brought into engagement first with one of the shafts 17 and then with the other, is as follows, the said mechanism being denominated the "reversing" mechanism: Disposed longitudinally within suitable bearings of the machine-frame is a shifting bar 27, provided with a suitable handle 28 at one of its outer projecting ends. Within a suitable notch in said bar there co-operates the free end of an arm 29, carried at the upper end of a vertically-mounted rock-shaft 30, said shaft being carried in suitable bearings on the outside of the frame, and the lower end of said rock-shaft having secured thereto a second arm 31, to the free end of which is pivotally secured a connecting-rod 32, (see Fig. 13,) whose opposite end is pivotally secured to one end of a shifting-lever 33, pivoted in a suitable bearing 34, carried by the machine frame, the free end of said lever embracing the shaft 24 between the collars 35.

From the connections just described it is apparent that if the bar 27 be shifted sufficiently in its bearings to rock the shaft 30 through the medium of the arm 29, the said shaft 30 will oscillate the arm 31, causing the latter to tilt the lever 33, under which circumstances the free end of said lever will longitudinally shift the drive-shaft 24 within its bearings a sufficient distance to cause one or the other of the friction bevel-wheels 23 to engage with its corresponding bevel 18, the particular bevel 18 engaged depending on the direction in which the shaft 30 is rocked. In other words, it depends on the direction in which the bar 27 is shifted.

In the operation of the machine the shifting of the bar 27 first in one direction and then in the other is accomplished by the traveling carriage at the end of its stroke, as follows: The carriage is provided with a depending lug 36, which is adapted to strike or impinge against an adjustable dog 37, held in any desirable position along the bar 27 by means of a binding-screw 38, co-operating with the notches 39, disposed uniformly throughout the length of the bar. It it apparent that the moment the lug 36 strikes one of the dogs 37 it will shift the bar 27 sufficiently to cause the latter, through the intermediate connections already described, to bring into engagement one of the bevel friction gear-wheels 23 of the drive-shaft with its co-operating bevel-wheel 18. Then when the carriage strikes the dog at the opposite end the friction gear-

wheels at that end will be brought into engagement and the mechanism will be reversed, causing the carriage to travel in the reverse direction and the grinding-disk to revolve in the opposite direction. This can be kept up indefinitely until the mechanism is stopped by the operator. The lengths of the strokes of the carriage will depend on the distance that the dogs 37 are spaced apart on the bar 27, and this distance in turn will depend on the width or size of the plate of glass to be beveled.

To stop the machinery the bar 27 can be seized by the handle 28 and shifted to a position as to just disengage both the bevels 23 of the drive-shaft from the bevels 18 on either side of the machine, or the drive-belt (not shown) which operates the pulleys 25 and 26 could be shifted from the fast to the loose pulley, in which event the machinery would also come to a stop.

In the line of travel of the carriage and below the rotating disk 7 is disposed a trough 40 for holding the grinding material, such as filings, sand, and the like. From the bottom of the carriage and embracing the rotating disk to one side of the center thereof depends a U-shaped bracket 41, to the bottom of which are secured the two polygonal-shaped scoops or funnels 42, axially tending in opposite directions, their mouths opening directly into the trough 40 above the base thereof, and each funnel having a delivery-opening 43 adjacent to the axis of rotation of the disk 7, and an extended lip 44 for properly directing the grinding material under the disk during the rotation of the latter and during the travel of the carriage. It is clear that as the carriage travels back and forth over the trough the funnels will scoop up the necessary quantity of grinding material, which in turn will be carried up under the rotating disk by the centrifugal action of the latter.

It is now in order to describe the operating-table on which the plate-glass is mounted, the means for varying the elevation of said table, and the means for adjusting the angle of the table by which the pitch or angle of the bevel edge of the glass is determined. The table 45 is a flat bed having supporting ribs or beams 46. To each of the lateral or outer ribs is pivoted, by means of a forked connection 47, a segmental supporting-arm 48, comprising, essentially, a hollow casting, in the depression 49 of which is adapted to fit a segmental rack 50, the teeth of which mesh with a pinion 51, carried at either end of a shaft 52, said shaft carrying at one end a worm gear-wheel 53, co-operating with a worm-wheel 54 at one end of a shaft 55, carried at the base of the frame, said shaft 55 being provided with a hand-wheel 56. Each arm 48 and its confined rack-bar 50 work in a boxing 57, fixed to the inner side of the standards 1 of the frame. It is clear that if the hand-wheel 56 is turned in one direction or the other the table will be raised or lowered at its pivotal points according to the direction in which said hand-wheel is turned. The table is pivoted along a line above its center of gravity, the tendency of the lower or free end thereof accordingly being to drop and keep the upper end of the glass plate 58 laid thereon in contact with the under surface of the grinding-disk 7. It is obvious from the mounting of the table and from its consequent tendency to tilt forward that the edge of the glass plate would constantly bear against the under surface of the grinding-disk during the rotation of the latter, and if no provision were made to check or limit the tilting tendency the disk would keep on beveling said edge until it attacked the table. To limit the tilting tendency, however, and to regulate the pitch or angle of the edge of the plate to be beveled, I provide a pitch-adjusting mechanism which will check the advance or sweep of the upper edge of the table according to the angle or pitch desired to be given to the glass. This mechanism is as follows: On each side of the frame of the machine is vertically mounted a shaft 59, having a reduced neck portion or offset 60, between the walls of which is confined the free end of a vertically-oscillating arm 61, rigidly secured to a rock-shaft 62, mounted in suitable bearings in the wall of the standard 1, the inner end of the rock-shaft having secured thereto a second arm 63. (See Fig. 10.) Now the lower end of the shaft 59 is screw-threaded, said screw-threaded portion operating in an interiorly screw-threaded bearing 64 and its free end being provided with a hand-wheel 65. It is apparent, therefore, that as the hand-wheel is turned in one direction or the other it will either raise or lower the shaft 59 in its bearings, and the said shaft in turn will rock the free end of the arm 63 up or down or to any desirable position, the parts remaining in their adjusted position until disturbed by the operator. The under surface of each arm 63 is adapted to bear against the upper curved surface of the terminal shoes or castings 66, secured to or forming part of the upper end of the tilting table. It is therefore apparent that the moment the said shoes once come in contact with the arms 63 the pitch of the bevel to be given the glass plate is determined, since the table cannot tilt beyond the point determined by the position of the arms 63 after their final adjustment.

To firmly hold the plate-glass on the operating-table I place a transverse retaining-bar 67, provided with a cushioning layer of rubber or equivalent material 68, immediately under the lower faces of the shoes 66 and between them and the plate, firmly securing said bar temporarily by wedges 69. (See Fig. 1.) This arrangement, too, prevents the grinding material from running down the surface of the glass, keeping the latter clear from dust during the beveling operation.

When the operation of beveling is complete,

the operator tilts the table out of contact with the grinding-disk, provision being made to prevent the table from tilting too far by a transverse projecting beam 70 striking a ledge 71, formed along the inner surface of the standards of the frame.

It is obvious, of course, that the present device can be used for purposes other than beveling. It may be employed for polishing and blocking, the disk 7 being displaced, of course, by a disk best adapted for the particular purpose.

Having described my invention, what I claim is—

1. In a machine for beveling glass, a suitable supporting table adapted to support the glass, a reciprocating and rotating grinding disk adapted to come in contact with the edge of the glass, said disk adapted to revolve or rotate in one direction about its axis during its travel along the edge of the glass in one direction, and means for automatically reversing the direction of rotation about its axis during its reciprocation or travel along the edge of the glass in the opposite direction, substantially as set forth.

2. In a machine for beveling glass, a suitable supporting table for supporting the glass, a reciprocating carriage, a rotating disk mounted therein adapted to come in contact with the glass, means for imparting rotation to the disk about its axis in one direction with one stroke of the reciprocating carriage, and automatically reversing the direction of the disk's rotation about its axis with the reverse stroke of the reciprocating carriage, substantially as set forth.

3. In a machine for beveling plate glass, a suitable supporting table, a reciprocating carriage mounted in proximity to the same, a rotating grinding disk mounted in said carriage, means for keeping the plate carried by the table in engagement or contact with the grinding disk, suitable pitch adjusting mechanism for said table, and means for reversing the direction of rotation of the grinding disk with each reciprocation of the carriage, substantially as set forth.

4. In a machine for beveling plate glass, a pivoted table, a reciprocating carriage mounted in proximity to the same, a reversing mechanism controlled by said carriage during the motion of the latter, suitable tracks for said carriage, a rotating grinding disk mounted in said carriage and controlled by said reversing mechanism, and suitable means for keeping the glass plate in contact with the grinding disk, substantially as set forth.

5. In a machine for beveling plate glass, a pivoted supporting table, a reciprocating and rotating grinding disk adapted to come in contact with the edge of the plate, means for tilting the table and plate carried thereby to any desired angle, suitable means for varying the elevation of the pivotal line of the table, and suitable devices for retaining the parts in their adjusted position, substantially as set forth.

6. In a machine for beveling plate glass, a suitable carriage, tracks for the same, a rotating grinding disk mounted in said carriage, suitable impelling gear mounted in the carriage and controlled by the rotating disk for imparting motion to the carriage, and suitable reversing mechanism controlled by the movement of the carriage for reversing the rotation of the grinding disk, substantially as set forth.

7. In a machine for beveling plate glass, a suitable carriage, a rotating grinding disk mounted in said carriage, a suitable receptacle or trough for the grinding material, means carried by the carriage for gathering and feeding the grinding material to the grinding disk, suitable impelling gear mounted in the carriage and controlled by the rotating disk for imparting motion to the carriage, and suitable reversing mechanism controlled by the motion of the carriage for reversing the rotation of the grinding disk, substantially as set forth.

8. In a machine for beveling plate glass, a suitable carriage, a rotating grinding disk mounted in said carriage, a suitable receptacle or trough for the grinding material, a series of funnels secured to the carriage and having their mouths opening into the receptacle in the line of travel of the carriage, suitable discharge openings in said funnels located adjacent to the rotating surface of the grinding disk, suitable impelling gear mounted in the carriage and controlled by the rotating disk for imparting motion to said carriage, and suitable reversing mechanism controlled by the movement of the carriage for reversing the rotation of the grinding disk, substantially as set forth.

9. In a machine for beveling plate glass, a suitable carriage, tracks for the same, a disk shaft, a drive pulley carried at one end of the same, idle pulleys on either side of said pulley, a drive belt having one lap passing between said series of pulleys, driving mechanism for said belt, a second shaft mounted in the carriage, suitable differential gearing between the two shafts for imparting a comparatively slow motion to the second shaft, a pinion carried by the second shaft, a rack bar cooperating with said pinion, a reversing device for the driving mechanism of the belt, and means carried by the carriage for controlling the reversing device, substantially as set forth.

10. In a machine for beveling plate glass, a suitable carriage, an endless drive belt for the same, vertical shafts mounted in the frame of the machine, belt pulleys carried by said shafts, a longitudinally shifting drive shaft adapted to set the vertical shafts alternately into motion, and suitable reversing mechanism controlled by the carriage for alternately shifting the drive shaft within its bearings

and thus reverse the travel of the carriage, substantially as set forth.

11. In a machine for beveling plate glass, a reversing mechanism comprising a shifting bar, dogs adjustably secured to said bar, a vertically mounted rock shaft having an arm at one end controlled by the shifting bar, a second arm secured to the opposite end of the rock shaft, a connecting rod pivotally secured to said second arm, and a tilting lever having its free end connected to the drive shaft and adapted to shift the latter in its bearings upon the oscillation of the free end of the lever, substantially as set forth.

12. In a machine for beveling plate glass, a pitch adjusting device comprising a vertically mounted shaft, said shaft being vertically adjustable, a rock shaft mounted in the frame in proximity thereto, an arm carried at one end of the rock shaft and adapted to be tilted by the vertical shaft during the vertical adjustment of the same, a second arm carried at the opposite end of the rock shaft, a pivoted table, and suitable castings or shoes carried at the upper end of the table and adapted to simultaneously bear against the inner arms carried by the rock shaft and hold the table in any of its inclined positions, substantially as set forth.

13. In a machine for beveling glass, a suitable traveling carriage, a rotating grinding disk mounted in said carriage, and means controlled by said carriage for automatically feeding suitable grinding material to the disk during the rotation of the latter, substantially as set forth.

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

ROBT. A. SCHLEGEL.

Witnesses:

ALFRED A. MATHEY,

E. STAREK.