



Sept. 4, 1928.

1,683,342

J. H. FOX

APPARATUS FOR SURFACING PLATE GLASS

Filed Nov. 4, 1924

4 Sheets-Sheet 2

FIG. 2.

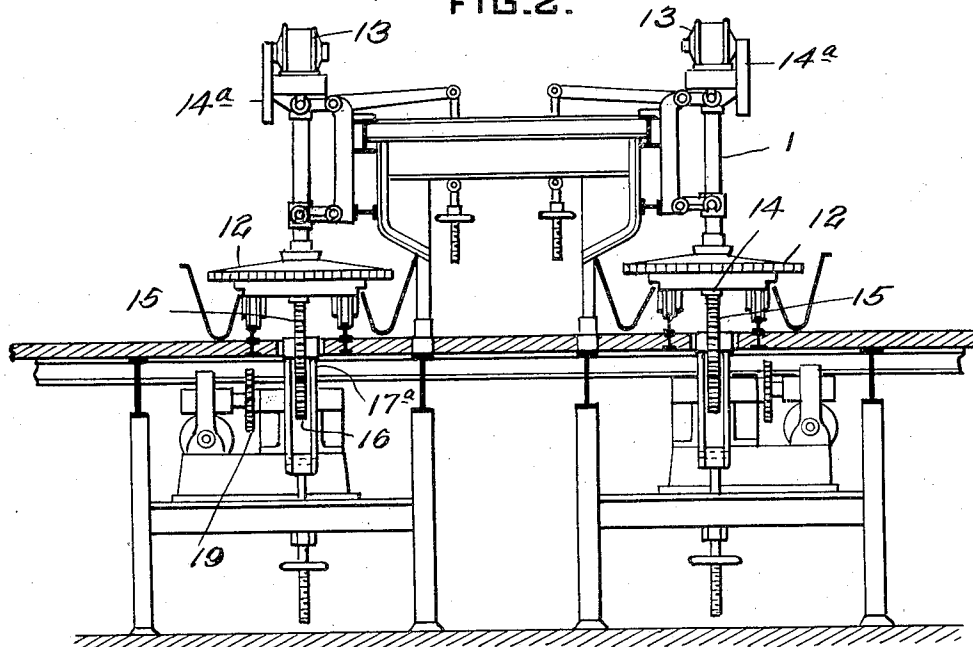
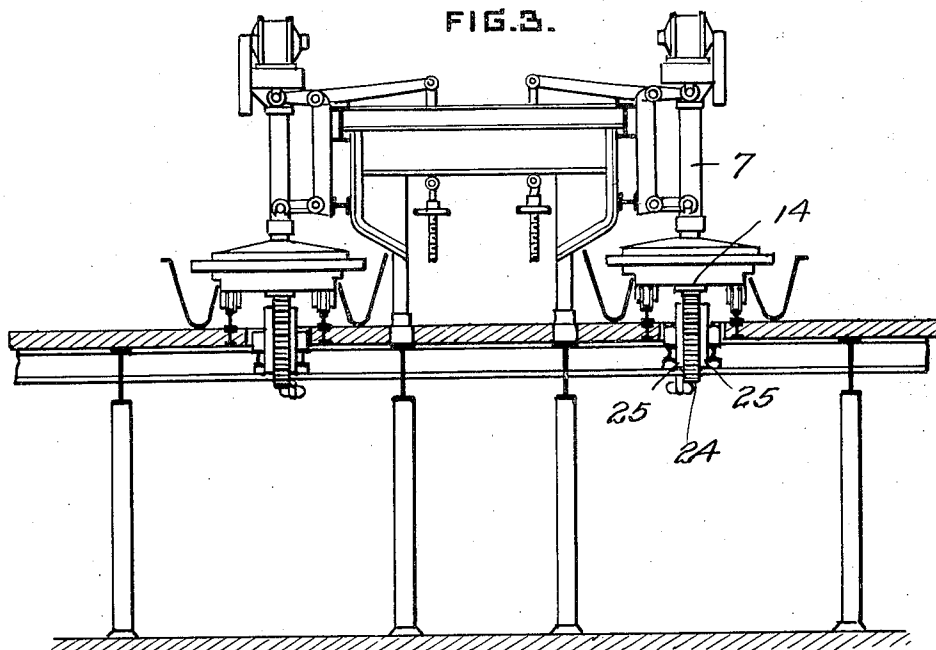


FIG. 3.



INVENTOR

John H. Fox  
James C. Brassey  
attys

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FIG. 4.

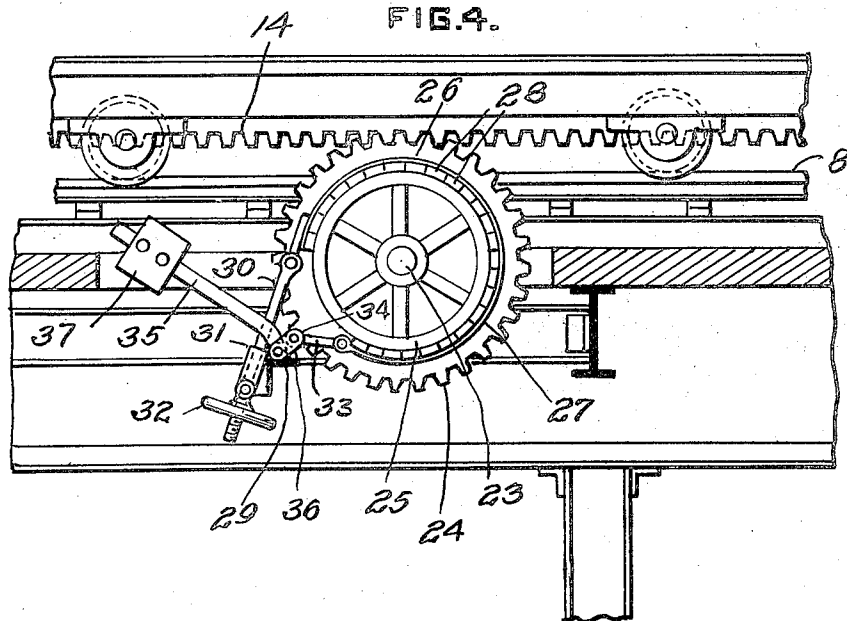


FIG. 5.

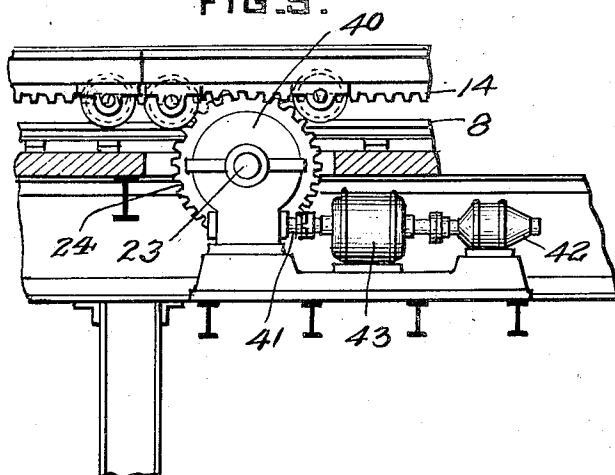
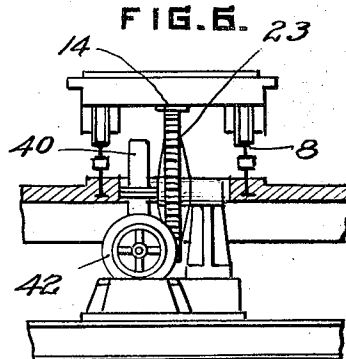


FIG. 6.



INVENTOR

John H. Fox  
by  
James C. Brassey  
attorney

Sept. 4, 1928.

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J. H. FOX

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FIG. 7.

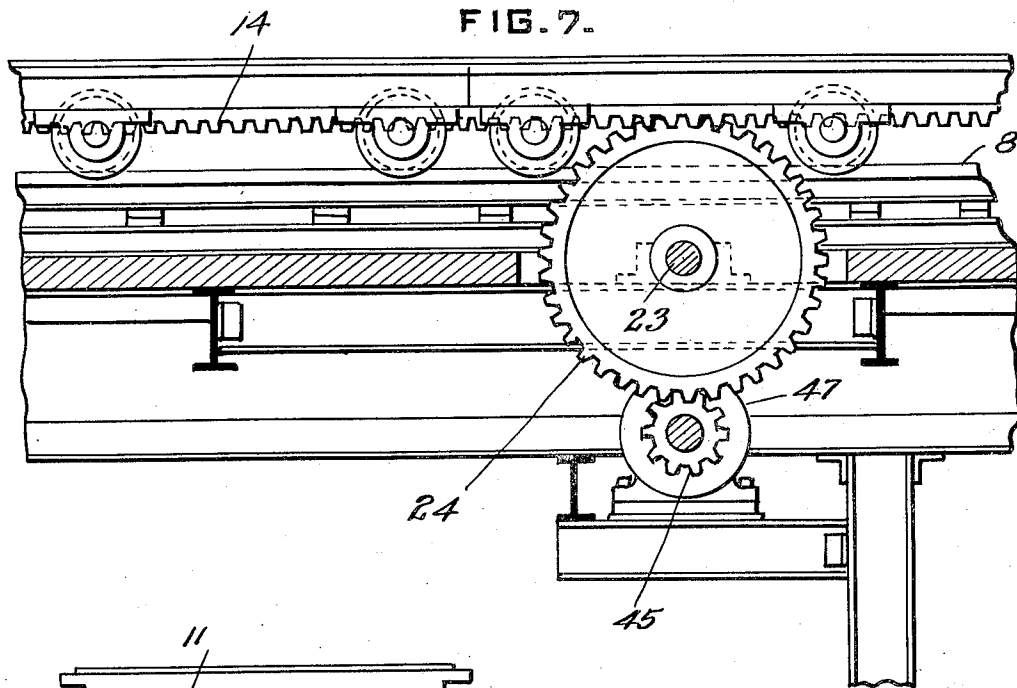
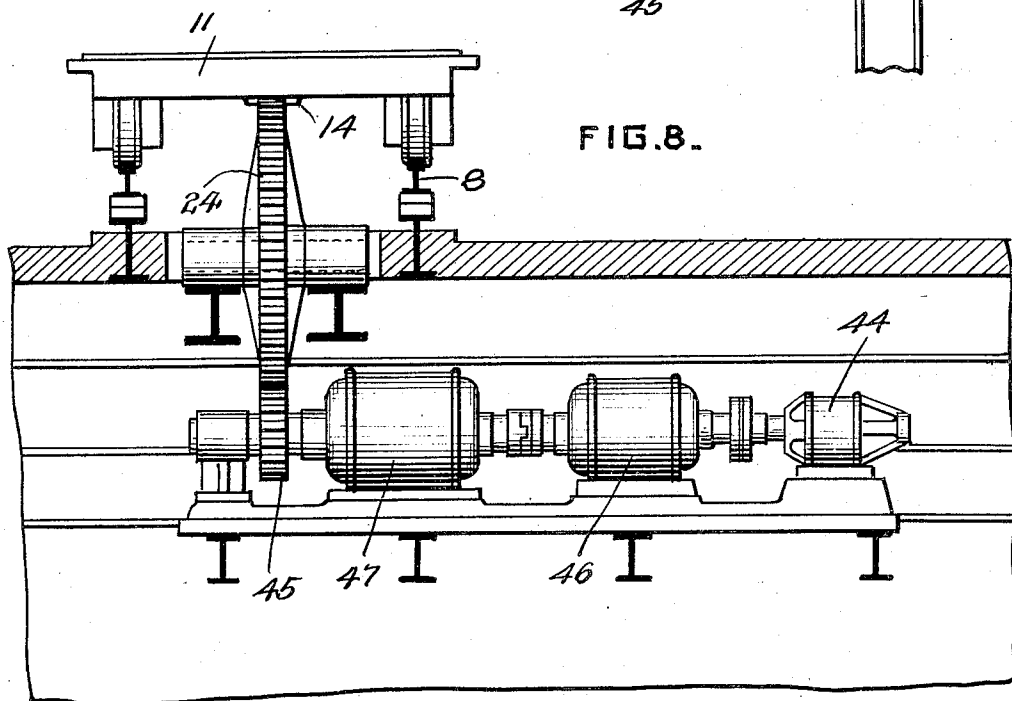


FIG. 8.



INVENTOR

John H. Fox

James C. Bradley  
attor.

## UNITED STATES PATENT OFFICE.

JOHN H. FOX, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO PITTSBURGH PLATE GLASS COMPANY, A CORPORATION OF PENNSYLVANIA.

## APPARATUS FOR SURFACING PLATE GLASS.

Application filed November 4, 1924. Serial No. 747,759.

The invention relates to apparatus for surfacing plate glass wherein the glass is carried on a train of cars or tables beneath a series of grinding and polishing machines.

It has for its primary object, the provision of means whereby the movement of the cars or tables is made smooth and uniform and free from the tendency to progress in a series of slight, but perceptible jerks. This jerky movement tends to interfere with the performance of the surfacing machines and to cause the cars to separate at their abutting ends, thus interrupting the continuous unbroken surface which would otherwise be maintained. Briefly stated, this result is secured by driving the train of cars from the rear end of such train and applying retarding means, preferably a yielding resistance, at the forward end of the train. The entire series of cars is in this way held in compression with their abutting ends throughout maintained tightly in contact, and with the power applied so far in excess of any variable resistance in the train of cars that such variation has a negligible effect upon the rate of movement. The use of this expedient will permit the usual coupling means employed between the cars of the train to be dispensed with, which coupling means are apt to become loosened and permit the cars to separate slightly, as heretofore referred to. The yielding resistance at the forward end of the train may be applied in many different forms, a few of which only are shown in the accompanying drawings wherein:

Figure 1 is a longitudinal section through the apparatus equipped with one form of the invention. Figs. 2 and 3 are end elevations of the apparatus. Fig. 4 is an enlarged detail view showing the brake employed in the Fig. 1 construction. Figs. 5 and 6 are side and end elevation views illustrating a modification. Figs. 7 and 8 are side and end elevation views illustrating another modification, and Fig. 9 is a wiring diagram for the construction shown in Figs. 7 and 8.

Referring to the general arrangement as shown in Figs. 1, 2 and 3, the reference numerals 1, 2 and 3 designate a part of a series of grinding machines and 4, 5, 6 and 7 a part of a series of polishing machines, arranged above the track 8 upon which is mounted a train of cars 9, 10, 11, etc., for carrying the glass to be ground and polished

beneath the series of grinding and polishing machines.

The grinding machines may be of any type, but as illustrated, consist of the runners 12 carried by vertical spindles driven from the motors 13 through suitable reducing gearing in the casings 14<sup>a</sup>. These runners are supplied with a mixture of sand and water to secure the usual grinding effect, the sand being supplied in finer and finer grades as the grinding progresses. The polishing machines are constructed similarly to the grinding machines, except that the runners are made up of felt polishing blocks which are supplied with a mixture of rouge and water.

The glass carrying cars or tables are provided with rigid beds upon which the sheets of glass to be ground and polished are secured in any suitable manner, preferably by the use of plaster and these beds about each other so that their upper surfaces are flush, plaster being applied intermediate the ends of the sheets of glass, so that a continuous flat surface is presented for the surfacing action of the grinders and polishers. Each car is provided upon the lower side of its bed with a rack bar 14 adapted to be engaged by the spur gear 15 located at the rear end of the train of cars. This gear 15 is driven from a gear 16 and is mounted upon a swinging arm 17<sup>a</sup>, so that the gear may be moved into and out of engagement with the rack, thus providing for a discontinuation of the movement of the train of cars without stopping the motor. The gear 16 is driven from an electric motor 17 through the intermediary of the spur gears 18 and 19 and a pair of worm reducing gears in the casings 20 and 21. The details of the mechanism for driving the gear 15 are immaterial in so far as the present invention is concerned and various forms of reducing gearing intermediate the motor 17 and the gear 15 may be employed. In order to provide for repairs and replacements without interrupting the operation of the system, a duplicate drive 22 is preferably provided alongside the drive just described, the details of construction being the same as those employed in the first drive.

The device for applying the yielding resistance to the forward end of the train of cars so as to maintain the entire series under compression with their ends in tightly abut-

ting relation, is shown at the right end of the construction of Fig. 1. As here illustrated and also shown in detail in Fig. 4, a transverse shaft 23 is employed carrying a spur gear 24 which meshes with the rack bar 14. Carried on the shaft 23 on opposite sides of the gear 24 are a pair of brake drums 25—25 (Fig. 3), each of which carries a brake band 26. These brake bands may be constructed in any approved manner, but preferably consist of a flexible steel band 27 carrying the friction blocks 28 of fiber or other composition.

The brake band is anchored at one end to the bracket 29 by means of the adjusting rod 30 which is threaded and extends through a sleeve 31 on the bracket, an adjustment being secured by means of the hand wheel 32. The other end of the brake band carries a connecting rod 33 connected at 34 to the ends of the lever 35 which is pivoted at 36 to the bracket 29. This lever carries a weight 37 adjustable longitudinally of the lever for giving the desired amount of tension to the brake band.

In this manner, a yielding resistance of any desired amount may be applied at the forward end of the train of cars tending to hold them against forward movement, so that the cars are placed under compression and any tendency of the cars to separate at their abutting ends is avoided and the forward movement of the train is made more uniform incident to the use of the increased resistance.

Figs. 5 and 6 illustrate another method of applying a retarding means at the forward end of the train of cars. In this instance, the shaft 23 which carries the gear 24 engaging the rack bars 14 on the tables is provided with a worm wheel located in the casing 40 and engaging a worm mounted on the shaft 41. This worm is driven from an electric motor 42 through the intermediary of reducing gearing in the casing 43. The motor 42 is set to operate at a speed such that the gear 24 tends to move the rack bars 14 forward at a speed slightly under the speed at which the tables are driven from the motor 17 (Fig. 1) at the rear end of the train of cars. This expedient, therefore, serves to place the train of cars under compression and furthermore, gives an exact regulation of the speed of the cars since the worm drive acts as a locking element and the motor 42 can be regulated so as to run at a constant, uniform speed.

Figs. 7 and 8 illustrate still another modification in which the electric motor 44 acts as a hold back at the forward end of the train of gearing. This motor is connected with the pinion 45 through a suitable train of reducing gearing in the casings 46 and 47, and the pinion 45 controls the movement

of the spur gear 24, meshing with the rack 14 on the bottom of the cars. By running the motor 44 at a speed such that the peripheral speed of the gear 24 would normally be less than the rate of movement of the cars as driven from the motor 20 (Fig. 1), a yielding hold back is provided which places the train of cars under compression and tends to hold the ends thereof against separation.

The wiring connections for the motors in this construction are illustrated in Fig. 9 wherein 49 and 50 are the current supply lines for the drive motor 17 and the hold back motor 44. The current through the field 51 of the motor 17 is controlled by the field rheostat 52, while the current through the field 53 of the motor 44 is controlled by means of the rheostat 54. 55 and 56 are the starters for the two motors, and 57 and 58 are ammeters indicating the current flow through the motors. By adjusting the rheostats 54 and 52, any desired degree of holding back effect by the motor 44 can be secured, the motor 44 under these conditions being made to act as a generator, which supplies its current to the circuit. The ammeters 57 and 58 are located together at the forward end of the machine, together with the control apparatus, and register the difference in current in the two motor circuits upon which the holding back effect of the motor 44 depends. This arrangement gives a holding back effect which can be regulated with a great degree of exactness and which is perfectly uniform as compared with a brake in which a certain variation in frictional resistance occurs constantly, particularly at slow speeds.

It will also be apparent that other resistance means might be substituted for the motor, such as that afforded by a centrifugal pump or an air compressor, or an ordinary motor generator, the invention contemplating broadly the use of any suitable resistance means for giving the desired yielding holding back effect at the forward end of the train of cars so as to maintain them in compression and insure a steadier and more uniform forward movement.

What I claim is:

1. The combination with a series of surfacing machines and a series of cars or tables mounted for movement therebeneath so as to carry glass sheets mounted upon the tops of the cars beneath the machines, of driving means applied at the rear end of the series of cars to move them forward, and a retarding means at the forward end of the series of cars adapted to engage and release each car in turn, so that the cars intermediate the driving means and retarding means are placed under compression.

2. The combination with a series of surfacing machines and a series of cars or

tables mounted for movement therebeneath so as to carry glass sheets mounted upon the tops of the cars beneath the machines, of driving means applied at the rear end of the series of cars to move them forward, and a yielding resistance at the forward end of the series of cars arranged to engage and release in turn each car as it passes thereover so that the cars intermediate the driving means and said resistance are placed under compression.

3. The combination with a series of surfacing machines and a series of cars or tables mounted for movement therebeneath so as to carry glass sheets mounted upon the tops of the cars beneath the machines, of driving means applied at the rear end of the series of cars to move them forward, a retarding means at the forward end of the series of cars, and means for varying the degree of resistance applied to the cars by such last mentioned means.

4. The combination with a series of surfacing machines and a series of cars or tables mounted for movement therebeneath so as to carry glass sheets mounted upon the tops of the cars beneath the machines, of a series of racks carried by the cars, driving means at the rear end of the series of cars including a pinion for engaging said racks and a motor for driving it, a gear located

at the forward end of the series of cars for engaging the racks, and means for applying a yielding uniform resistance to the rotation of said gear.

5. In sheet glass surfacing apparatus, a plurality of trucks adapted to carry a series of sheets to be surfaced, means for moving said trucks beneath a plurality of surfacing units, and a brake mechanism for retarding the movement of the trucks.

6. In sheet glass surfacing apparatus, the combination with a plurality of trucks adapted to carry a series of sheets to be surfaced, racks carried by said trucks, and means engaging said racks for moving said trucks beneath a plurality of surfacing units, of means also engaging said racks for retarding the movement of said trucks.

7. In sheet glass surfacing apparatus, the combination with a plurality of trucks adapted to carry a series of sheets to be surfaced, racks carried by said trucks, and means engaging said racks for moving said trucks beneath a plurality of surfacing units, of a brake mechanism also engaging said racks for retarding the movement of said trucks.

In testimony whereof, I have hereunto subscribed my name this 3rd day of November, 1924.

JOHN H. FOX.