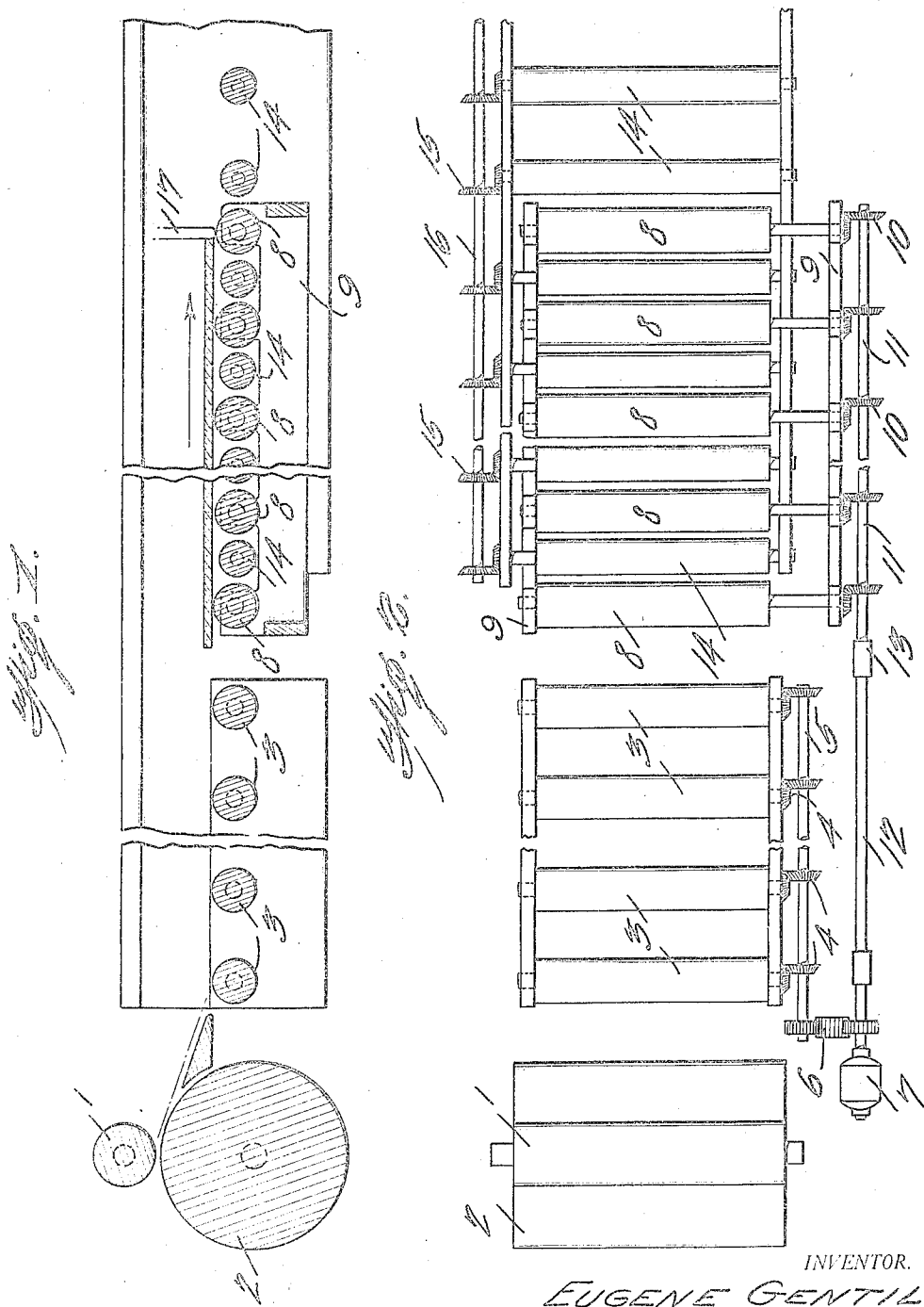


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TAKE-OFF AND CONVEYER MECHANISM FOR INTERMITTENT  
SHEET GLASS FORMING MACHINES  
Filed Dec. 30, 1927

1,889,065

3 Sheets-Sheet 1



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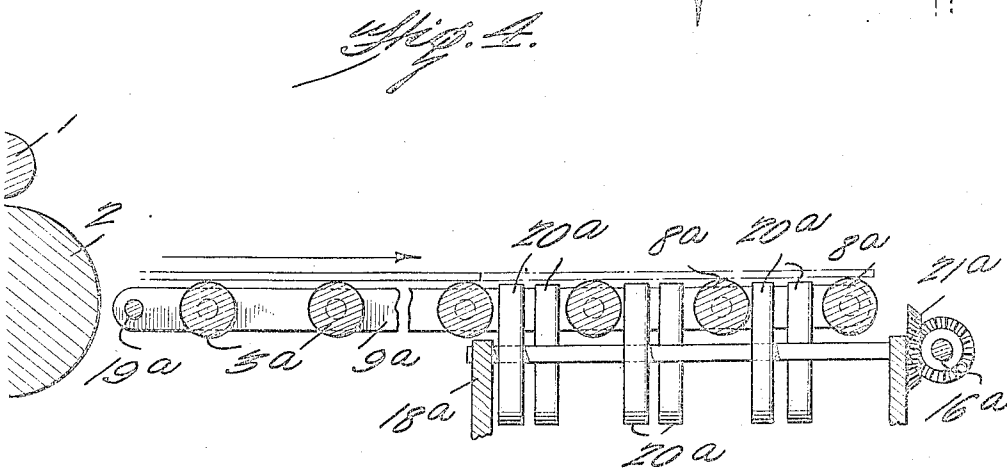
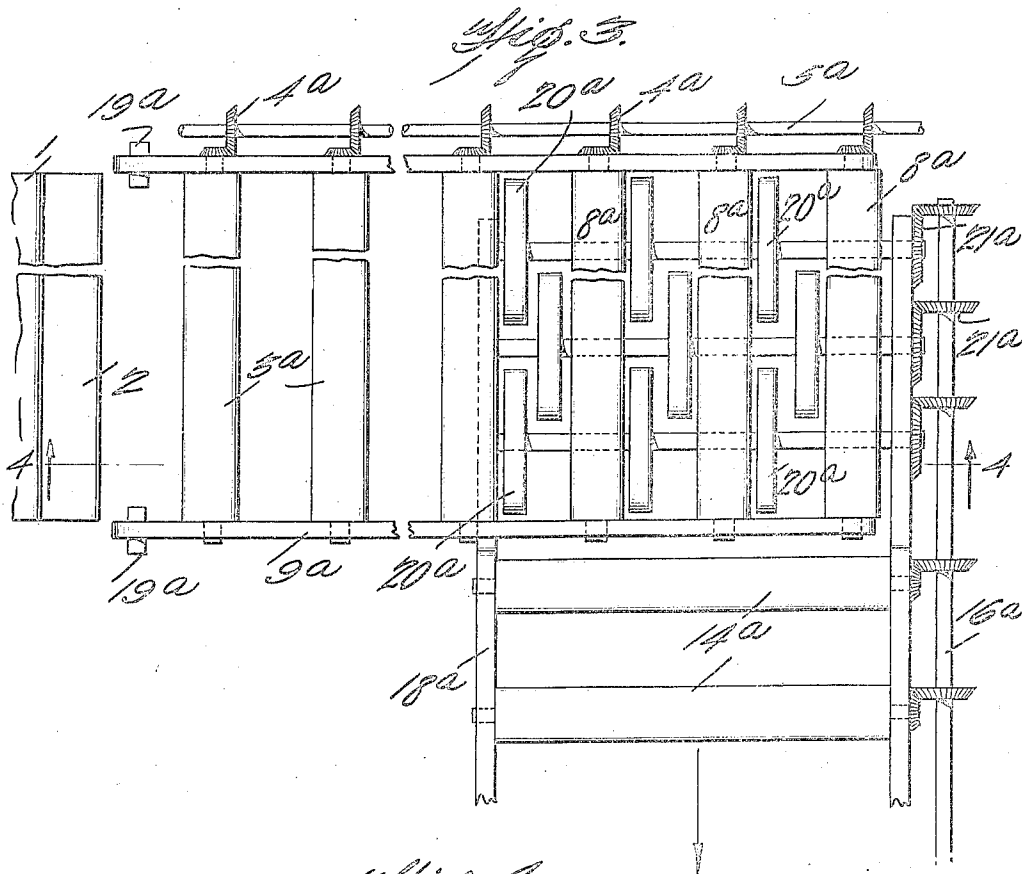
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3 Sheets-Sheet 2



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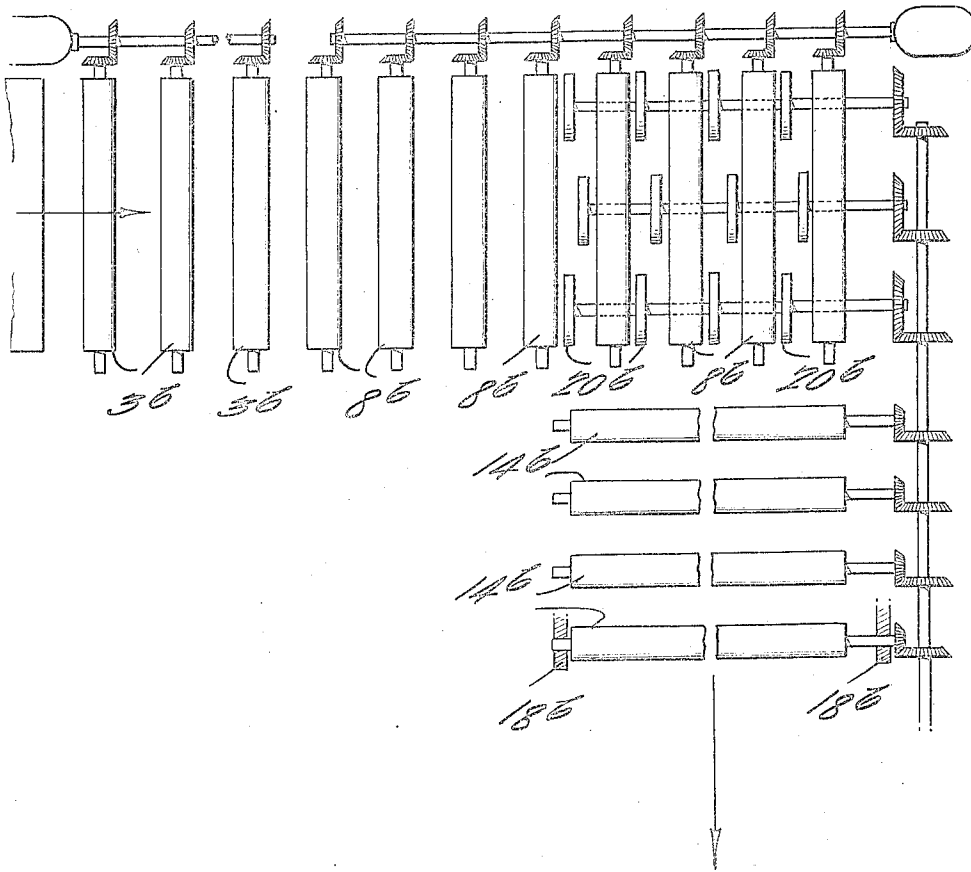
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3 Sheets-Sheet 3

*Fig. 5.*



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## UNITED STATES PATENT OFFICE

EUGENE GENTIL, OF PARIS, FRANCE, ASSIGNOR TO THE AMERICAN BICHEROUX COMPANY, A CORPORATION OF DELAWARE

TAKE-OFF AND CONVEYER MECHANISM FOR INTERMITTENT SHEET GLASS FORMING MACHINES

Application filed December 30, 1927. Serial No. 243,655.

Sheet glass conveyers, comprising a series of driven rolls, have been used for many years to receive sheet glass from continuous sheet forming machines, and to convey the sheet through the lehrs. As the speed of sheet formation in the continuous machines is not high, this use of roller conveyers, which have approximately the same speed of travel as the speed of sheet formation, has been satisfactory. Difficulties arise, however, if intermittent sheet forming machines are used. These latter machines have high speed of sheet formation and, as a result, the conveyers, if they have the speed of sheet formation, must be lengthy if the glass is to remain on them for the period generally required for cooling, and for annealing if the conveyers are to feed through the lehrs. This difficulty also exists in roll conveyers taking off plates from metal plate forming machines which are also intermittent in their action, and to meet it with such machines the suggestion has been made to divide the rolls of the conveyer into two sections, the rolls of one section (which receives the plate from the forming machine) being driven at a peripheral speed the same as that of the sheet formation, and the rolls of the other section (which receives the plate from the rolls of the first section and on which the cooling takes place) being driven at a lower rate of speed, so that the distance traveled by the sheets during a certain cooling time will be less than if the sheets traveled uniformly at the speed of sheet formation. With such an arrangement the periods between the formation of successive sheets is made such as to prevent crowding of the sheets on each other when delivered to the slow-speed section. In such an arrangement, however, each plate will be subjected to drive at its rear end by high-speed rolls while its forward end is being taken away by a slow-speed roll. This in thin glass may result in a buckling of the glass. Various schemes have been proposed to avoid this difference in drive on the two ends of the glass sheets when the plate is shifted from one speed to the other, such schemes generally embodying idlers, or certain rolls whose speed may be varied to re-

ceive the sheet at one speed and after the sheet rests thereon to send it forward at a lower speed. I propose, however, to avoid the buckling, not by the use of idlers or variable speed rolls, but by providing a mechanism for simultaneously delivering the sheet of glass throughout its length from the high-speed rolls to the low-speed rolls, and this I accomplish, preferably by lowering the high-speed rolls on which the sheet may be supported through spaces between low-speed rolls, which then receive and drive the sheet, the feed effected by the low-speed rolls being either in the line of feed of the high-speed rolls or at an angle thereto as may be desired. It is obvious that either all, any, or none of the high-speed rolls or the low-speed rolls may be enclosed in a suitable furnace structure by which the glass may be annealed.

My invention further consists in the construction, arrangement and combination of certain parts by which the results above noticed may be accomplished.

Referring to the accompanying drawings in which corresponding parts are designated by corresponding marks of reference,—

Figure 1 is a diagrammatic sectional view of a conveyer embodying my invention and adapted to receive sheets from an intermittent sheet forming machine to convey the same through a lehr, the line of feed of the high and low speed sections being in line with each other.

Figure 2 is a plan view thereof.

Figure 3 illustrates another form of my invention in which the high speed section of the conveyer receiving the sheets from the forming machine has its line of feed at right angles to the feed of the low speed section, the high speed section being shown as entirely outside of the lehr.

Figure 4 is a vertical section on line 4—4 of Figure 3.

Figure 5 is a view of a structure embodying a feature of my invention in which the conveyer embodies a high speed section taking off from the forming machine and a variable speed section, both shown as located externally of the lehr, a lehr conveying section, and mechanism similar to that shown in

Figures 3 and 4 for transferring the sheets from the variable speed section onto the lehr section.

In the drawings 1 and 2 represent the forming rolls of a suitable intermittent sheet forming mechanism, which forms and delivers the sheets at a relatively high rate of speed with periods of intermission between the formation of successive sheets. The sheets are delivered as formed to a roller table conveyer.

In Figures 1 and 2, the conveyer has a series of rolls 3, driven by intermeshing bevel gears 4 through the shaft 5 and intermediate pinion 6 from the motor 7 at the same peripheral speed as the speed of sheet formation, these rolls being at the entrance or receiving end of the roller conveyer. Immediately following and in line with the rolls of the series 3 are the series of rolls 8 mounted in a rising and falling frame 9 and driven through the intermeshing bevel gears 10 and shaft 11 by the motor 7. To permit the up and down movement of the frame without interrupting the drive of the rollers 8 the connection between the motor 7 and shaft 11 may be made by the shaft 12 and universal joints 13, the gearing being such that the rolls 3 and 8 are driven with the same peripheral speed.

A third series of rollers 14 are also present in the conveyer, the initial rolls of this series being interposed between the rolls 8 of the second series, their upper peripheries being, when the rolls 8 are in their upper position, below the level of the upper peripheries of the latter. The rolls 14 are driven by the bevel gears 15 from a shaft 16 at a desired peripheral speed less than that of the peripheral speed of the rolls 3 and 8 and of the speed of sheet formation.

In the operation of the device as thus disclosed a sheet of glass formed by the forming rolls 1 and 2 is delivered to the rolls 3 and by those rolls is carried off as rapidly as formed, and is finally delivered to the rolls 8. When the entire length of the sheet is on the rolls 8 these rolls may be lowered, transferring the support of the sheet to the rolls 14 interposed between them, the transfer of the sheet from rolls 8 to rolls 14 being simultaneously throughout the length of the sheet. The sheet will now be fed forward not by the rolls 8, but by the rolls 14 and as the transfer is simultaneous throughout the length of the sheet it will be seen that the sheet will not be subjected to unequal driving strains on its front and rear ends, tending to buckle it.

The lowering of the frame in which the roll 8 is carried may be made automatic by suitable counter-balancing the frame in which the rolls 8 are carried as by the weight 19, so that the weight of the sheet effects the transfer, or it may be made automatic by

providing a trigger mechanism (indicated diagrammatically at 17) which when struck by the forward end of a sheet entirely resting on the rolls will cause the lowering of the frame 9.

It is obvious that any, all or none of the rolls 3, 8 and 14 may be enclosed in a suitable lehr structure which, however, is indicated diagrammatically at 18 as enclosing all of the said rolls.

In the construction shown in Figures 3 and 4 the conveyer bed is in two sections, namely, a high speed section and a low speed section, whose lines of feed are at right angles to each other. In these figures the high-speed rolls 3<sup>a</sup> and 8<sup>a</sup> of the high speed section are driven by bevel gears 4<sup>a</sup> from a shaft 5<sup>a</sup>.

Interposed between the terminal rolls 8<sup>a</sup> are a series of rolls 20<sup>a</sup> whose axis of rotation is at right angles to the axis of rotation of the rolls 3<sup>a</sup>. The rolls 20<sup>a</sup> normally have their upper peripheries slightly below the level of the upper periphery of the roll 8<sup>a</sup>. The rolls 8<sup>a</sup> are carried (and the rollers 3<sup>a</sup> may be carried) in a suitable rising and falling frame 9<sup>a</sup>. To effect this the frame 9<sup>a</sup> may be pivoted on a horizontal pivot at 19<sup>a</sup> adjacent to the forming machine, so that the rolls 8<sup>a</sup> will be lowered by lowering the frame 9<sup>a</sup> on its pivot. By preference a plurality of rolls 8<sup>a</sup> are arranged staggered between each pair of the rollers 3<sup>a</sup>. The rolls 20<sup>a</sup> are driven by bevel gears 21<sup>a</sup>.

The low speed section of the conveyer is placed opposite the rolls 20<sup>a</sup> and the axes of the low-speed rolls 14<sup>a</sup> mounted thereon are parallel with the axis of the rolls 20<sup>a</sup>, the drive shaft 16<sup>a</sup> of the low-speed rolls also driving the gears 21<sup>a</sup> of the rolls 20<sup>a</sup>, the rolls 20<sup>a</sup> and the rolls 14<sup>a</sup> being preferably driven at the same peripheral speed. By preference the low speed roller 14<sup>a</sup> may be enclosed in a lehr 18<sup>a</sup>, but the lehr may also enclose any or all of the rolls 3<sup>a</sup>, and 8<sup>a</sup>.

With such a construction it will be seen that the glass sheet delivered by the forming machine is conveyed by the rolls 3<sup>a</sup> to the rolls 8<sup>a</sup>, and that upon the descent of the frame 9<sup>a</sup>, effected manually or automatically in either of the ways before suggested, the support of the sheet will be transferred to the rolls 20<sup>a</sup>, which will feed the sheet laterally onto the rolls 14<sup>a</sup> which as stated, may be enclosed with a suitable lehr structure. This in itself is desirable in that it provides a feed through the lehr in the direction of the width of the sheet thereby permitting a greater number of sheets to be handled in the same length of lehr at the same speed of movement.

Figure 5 diagrammatically represents a structure embodying the lateral transfer of the sheet shown in Figures 3 and 4. It however embodies the slowing of the sheet movement not by the action of such lateral trans-

fer, but on a straight run of the first section of the conveyer table. In this figure the rolls 3<sup>b</sup> are driven at the speed of sheet formation. The rolls 8<sup>b</sup> are variable speed rolls, that is to say may be driven at the same speed as the rolls 3<sup>b</sup> or at a lower speed, which however need not be the speed of the feed throughout the lehr.

The rolls 8<sup>b</sup> are mounted in a rising and falling frame as are the rolls 8<sup>a</sup> of Figures 3 and 4, and have interposed between them the non-rising and falling transverse rolls 20<sup>b</sup>, similar to the rolls 20<sup>a</sup> of Figure 3, and like those rolls driven at the same peripheral speed as the rolls 14<sup>b</sup> of the transverse conveyer, which may be enclosed in a lehr 18<sup>b</sup>.

The device shown in Figure 5 permits the sheet to be received from the forming machine at its speed of formation, and permits the speed of that sheet to be reduced prior to its location in front of the lehr, as is often desirable, and this without an excessive length of the conveyer outside of the lehr, whereas if all of the rollers 3<sup>b</sup> and 8<sup>b</sup> were driven at the speed of sheet formation this might require an excessive length of the conveyer section outside of the lehr. However, with the construction shown, as soon as the sheet is received on the rolls 8<sup>b</sup> the latter may be slowed down, the limitation on the slowing being the tendency of the glass to sag between the rollers due to the passage of points thereon over the successive rollers. The speed necessary to prevent this however is much less than the speed of sheet formation. It is obvious that with the construction shown there may be a stepping down of the speed between the rolls 3<sup>b</sup> and 8<sup>b</sup> and a second stepping down of the speed between the rollers 8<sup>b</sup> and 14<sup>b</sup>, the speed of the last named roller being that proper for lehring while the speed of the rollers 8<sup>b</sup> is selected with the point of view of preventing the sagging in question while permitting the shortening up of the conveyer section outside of the lehr.

Having thus described my invention what I claim and desire to secure by Letters Patent is:—

1. A conveyer table for sheet glass having two sections arranged at right angles with each other and each comprising a series of driven rolls adapted to receive a hot sheet, a series of driven rollers interposed between certain rollers of one of the sections and having their axis of rotation parallel with the axis of rotation of the rolls of the other section and having their periphery slightly below the periphery of the rollers of the first section, with means for causing relatively vertical movement between rollers of the first section and the interposed rolls to transfer the support of the hot sheet from the rolls of the first section to the interposed rolls.

2. The combination with an intermittent sheet forming machine having high speed

of sheet formation, of a conveyer receiving hot sheets therefrom having two sections arranged at right angles with each other, and each comprising a series of driven rollers to receive the glass, a series of driven rollers interposed between certain rollers of one of the sections and having their axis of rotation parallel with the axis of rotation of the rolls of the other section and having their periphery slightly below the periphery of the rollers of the first section, means for causing relatively vertical movement between rollers of the first section and the interposed rolls to transfer the support of the hot sheet from the rolls of the first section to the interposed rolls, and means for driving the rolls of the first section at approximately the speed of sheet formation, and for driving the interposed rolls and the rolls of the second section at a lower rate of speed.

3. The combination with an intermittent sheet forming machine having high speed of sheet formation, of a conveyer receiving hot sheets therefrom and comprising a series of rolls driven at approximately the same peripheral speed as the speed of sheet formation, a second series of rolls in line therewith, means for driving the same at variable speed, a third series of rolls located at right angles to the variable speed rolls, a series of rolls interposed between certain rolls of the second series and rotated at right angles thereto, means for changing the relative vertical elevation of the last named series of rolls and the variable speed rolls of the second series, and a lehr enclosing the rollers of the third series.

In testimony whereof I hereunto affix my signature.

EUGENE GENTIL.