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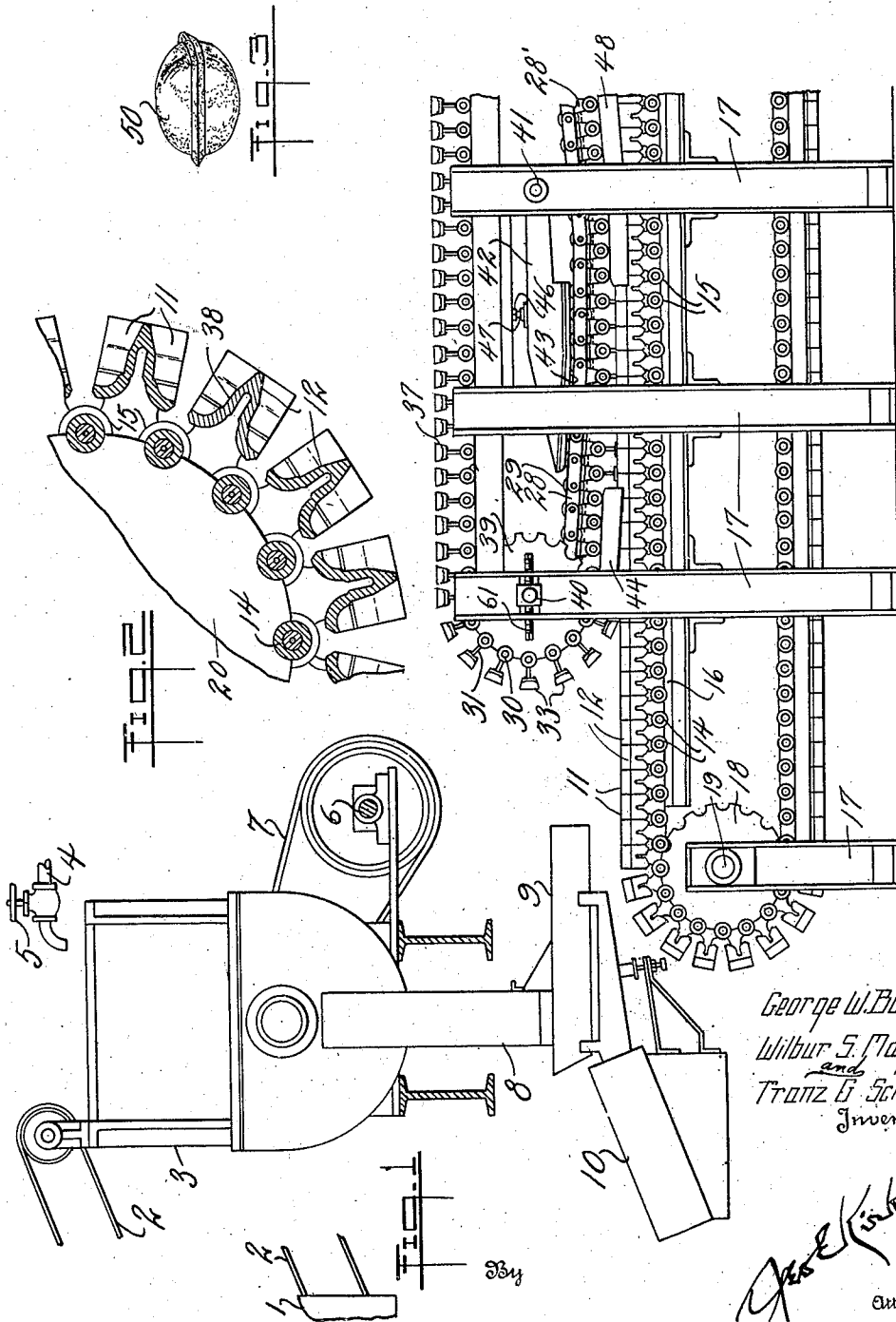
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2,214,191

PRESSURE NODULE APPARATUS

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3 Sheets-Sheet 1



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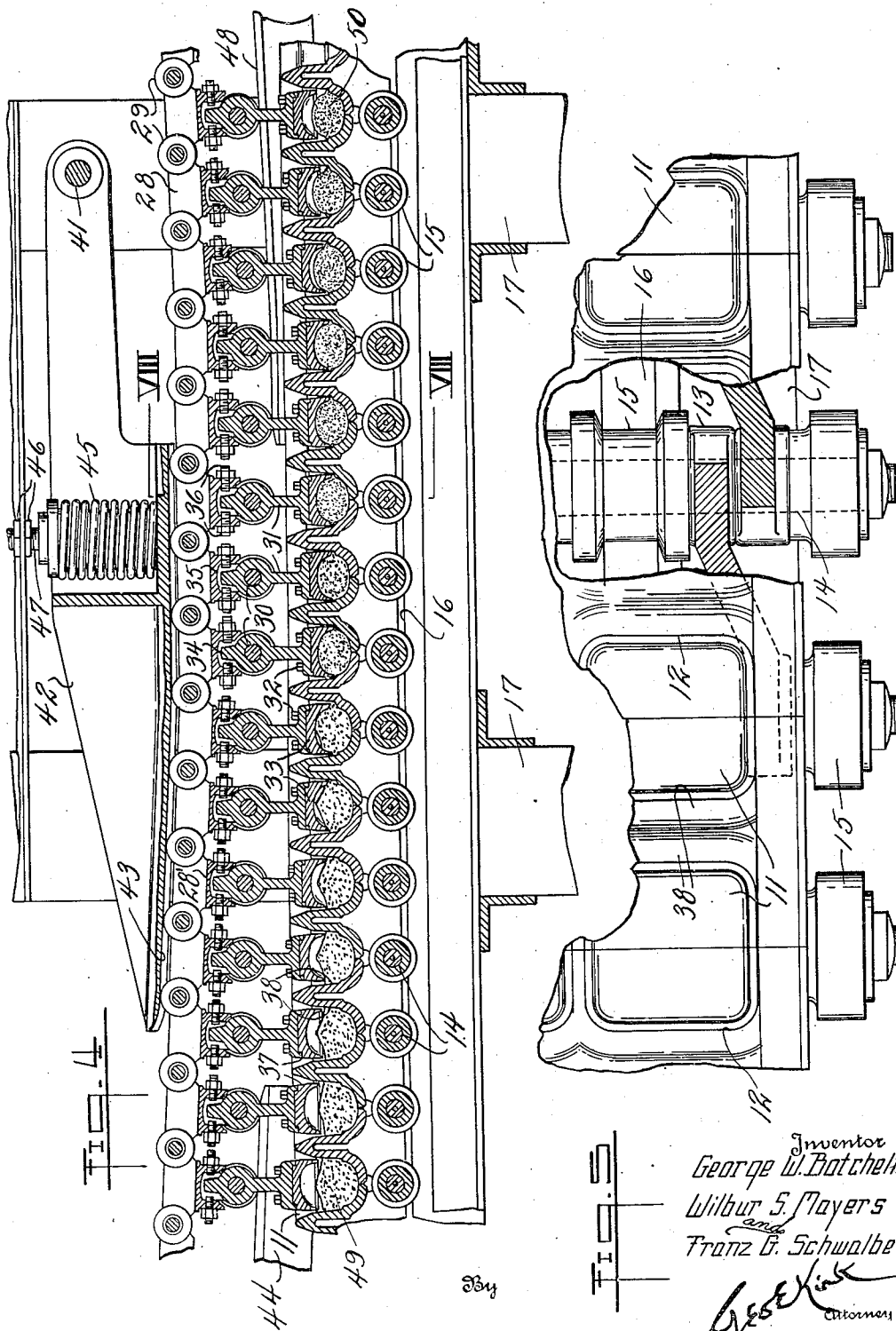


FIG. 1

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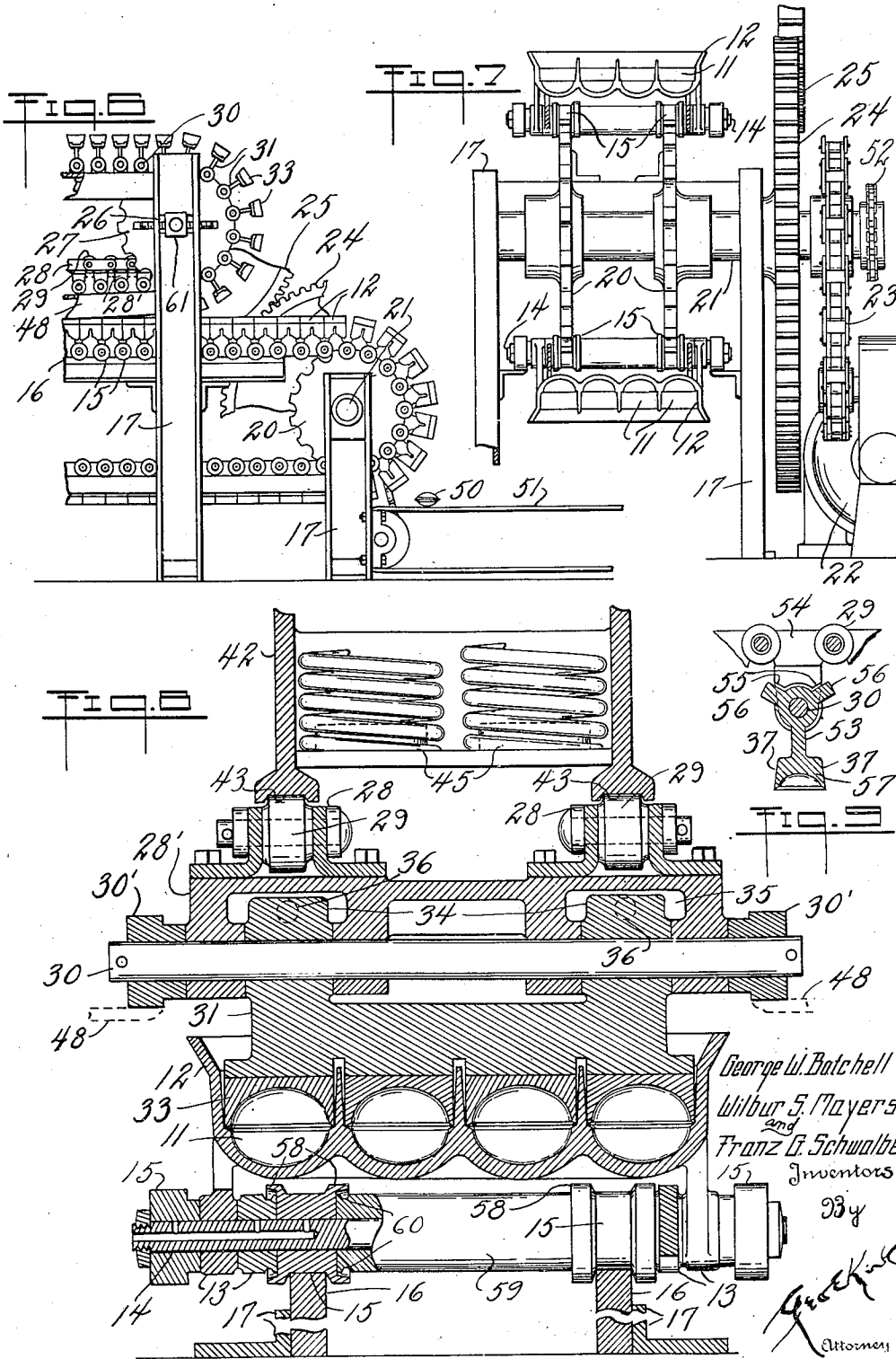
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UNITED STATES PATENT OFFICE

2,214,191

PRESSURE NODULE APPARATUS

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Application August 1, 1938, Serial No. 222,374

2 Claims. (Cl. 49—63)

This invention relates to the grouping coherence of fines as a mass and constituents for a melt.

This invention has utility when incorporated as a pre-formed supply more or less vitreous mass for glass furnace or cupola furnace to be the ingredients as combined for the melt.

Referring to the drawings:

Fig. 1 is a side elevation, with parts broken away, showing an embodiment of the invention for the manufacture of nodules for a glass furnace whether the glass be for mold, blown, or flat product;

Fig. 2 is a detail view on an enlarged scale of features of the linkage showing the pocket opening means;

Fig. 3 is a perspective view of one of the nodules as formed by the machine;

Fig. 4 is an enlarged view along the pockets as press forming the nodules;

Fig. 5 is a fragmentary view in plan of the forms or the pockets;

Fig. 6 is a view of the take-off portion from the nodule forming conveyors;

Fig. 7 is a view of the features of the drive connections between the conveyors;

Fig. 8 is a section on the line VIII—VIII, Fig. 4, showing the compacting relations of the plunger elements in the pockets; and

Fig. 9 is a detail view of the plunger element in which the number of parts is reduced.

Dry mixer 1 groups the elements of sand, lime, lead, soda ash, cullet, and other fines for melted glass, which may be brought by elevating conveyor 2 and dumped into mixer 3 (Fig. 1). In this mix may be established a suppression of the dust through the medium of a binding element, whether such be water glass, or in the instance of milk of lime, lime water, or hydrated lime, if such be in liquid form. This added moisture from supply duct 4 may be controlled by valve 5 and discharge of the mixer 3 driven from the shaft 6 by belt 7.

From this mixer 3 there may be delivery spout 8 to pan 9 operated by vibrator 10. There is thus effected shaking uniformly continuous delivery from this pan 9 of the mix having bonding agent therefor to flow uniformly into pockets 11. These pockets 11 have wall section 12 rising therefrom, while therebelow are eyes 13 completing this link element of the pan carrying pins 14 with rollers 15, one at each side of the chain or horizontal reach of the conveyor, to travel on track 16 carried by supports 17. This conveyor upper reach extends from idler sprocket wheel

18 on shaft 19 positioned adjacent the supply pan 9 to sprocket wheel 20 on drive shaft 21. Actuating this shaft 21 is motor 22 having transmission connection 23 (Figs. 6 and 7) thereto. This shaft 21 has gear wheel 24 thereon in mesh with similar gear wheel 25 on shaft 26 to drive sprockets 27 actuating sprocket chains having links 28 between rollers 29.

These links 28 through elements 28' carry pins 30 upon which hang brackets 31 having cap screws 32 mounting packer elements 33 (Figs. 4 and 8) to enter the respective pockets 11. These brackets 31 remote from the pockets 11 have lugs 34 in recesses 35 permitting swinging joint action on the shaft 30 limited by adjustable set screws 36 on opposite sides of these lugs 34. For this coaction, the presser elements 33 as complementary to the pockets 11 have tapered side portions 37 against too close clearance with beveled sides 38 of the pockets 11.

This sprocket chain comprising the links 28 between the rollers 29 has horizontal reach extent from the sprocket 27 to idler sprocket wheel 39 on shaft 40. These shafts 26, 40, are carried by the frame 17 in fixed position relatively to the pocket-carrying conveyor.

Also anchored on this frame 17 is pivot pin 41 (Fig. 4) from which extends horizontally pressure applying arm 42 having inclined lower face 43 to act on the rollers 29, thereby progressively to direct the path of these rollers in bringing the presser elements 33 into the pockets 11, after these pockets pass around the wheel 18, and by way of guide 44 at rollers 30' are allowed gradually to enter the respective pockets 11. This holding arm is of the general direction of the reach of the conveyor chain directly therebelow and bearing on the rollers 29 in the nature of a self-laying track holder, termed in motor vehicle practice, of the so-called "caterpillar" type.

As this travel in the upper reach of the pocket-carrying conveyor clears these presser elements 33 from the guide 44, the arm 42 is effective and its pressure spring means 45 adjusted by nuts 46 on stem 47. As this arm length becomes shorter toward the pivotal mounting 41, the pressure action gradually increases in the forcing of the packer elements 33 into the pockets 11. In this continuous operation, as the rollers 29 clear this pressure arm 43, lifter incline 48 is effective at rollers 30' gradually to urge the elements 33 clear of the pockets 11 so that as the upper reach of the pocket-carrying conveyor continues to its terminus, the pockets 11 may have the sides thereof spread, as passing about the sprocket

wheel 20 and thereby free the pocket so that uncompacted mass 49, as initially entering the pockets, may as compacted mass 50 be rolled from the pocket to fall on take-off conveyor 51 as driven by sprocket wheel 52 from the shaft 21. This conveyor 51 may transport the formed press-molded nodule of glass melt sections to the factory floor adjacent the furnace or for storage in a bin ready to provide dustless charging material into the furnace. This means that silicosis and dangers from glass factory dust are materially minimized, if not absolutely eradicated, and there is a resultant efficiency in uniformity of melt as predetermined for the ingredients with an economy in the firing.

In lieu of the brackets 31 there is shown (Fig. 9) bracket 53 on the pin 30 coacting with special link 54 having clearance 55 for lugs 56 allowing for the sufficient swing or automatic alignment of plunger compacting or packing element 57 into the pocket as coming into packing position and also for the lifting therefrom as well as clearing of the pocket as the pressing action is completed. It is important that this compacting or packing plunger face member 33 and 57 be resistant to abrasion action of the special ingredients, particularly when, as herein, the lumps or nodules are of the elements for glass melt. This abrasive resistant member for the plunger as well as for the pocket is to be effective in the duration of life for performance hereunder, even the handling of the vitreous mass for glass manufacture. This means that, in addition to the strength or compacting, there is a general hardness at least as to surface finish, or resistance to abrasion.

In this operation of the machine, in subjecting to this range of pressure it is important to avoid working of this grit into the bearings. Accordingly, the rollers 15 (Fig. 8) have overhanging flanges 58 into which extend the sleeves 59 and links 13 on the bearing pins 14. Furthermore, these sleeves 59 have grooves 60 under this overhang 58 tending to direct any passage of grit away from the end of the sleeve and away from the roller but to be thrown clear of working into the bearing.

The packing element carrying conveyor is one which, due to the grit or abrasive character of the supply material and the desire to have such brought into effective packing relation, involves nicety for registry therebetween. To such end the respective shafts 26, 40, may be adjusted by shaft adjusting means 61 for the desired nicety in this control. This compacting is desirably one conducted with the state of the material approaching that of molding sand in a foundry, that is, there is a binder content which under the extremes of pressure high per square inch, brings about a compacting short of oozing out for creating a sticky mass but effective to produce a hard smooth surface on this nodule. This assures that the character of the mix as dry assembled or compacted in this nodulizer is one which maintains the ingredients against segregation. There is thus a reliable character for the melt to be effective, insuring an economy in fusing due to the voids between the nodules giving definite exposed surface areas as distinguished from dust blanket portions.

What is claimed and it is desired to secure by Letters Patent is:

1. Pressure nodule manufacturing apparatus more particularly for ingredients in the manufacture of glass, said apparatus comprising links, pivot pins connecting the links to form an endless series chain, said respective links being shaped to form a pair of oppositely facing pocket sections in an upwardly open horizontal reach of said chain, the pocket section of one link as toward the pocket section of the adjacent link being complementary thereto at abutting position therebetween and shaped to provide an outwardly flaring entrance to the pocket for receiving a supply of granular material having voids between the granules thereof, pivotally mounted plunger means, a mounting chain device locating the plunger means normally for a reach spaced from and parallel to the upwardly open pockets, a rigid opposing sustaining holder for the horizontal reach of the chain, thereby to lock the mold pockets therealong in closed position, a positive guide for directing the plunger means to rock relatively to the device and be self-centering in entering into the pockets as locked closed by the holder, for initially compressing the material into the pockets, and pivoted arm controlling means operable further to increase the extent of travel of the plunger means into the pockets by thrusting the plungers in succession and gradually deeper into the pockets during the continuation of the progress of the pockets along the reach, thereby to reduce still more said voids by compacting the material.

2. Pressure nodule manufacturing apparatus more particularly for ingredients in the manufacture of glass, said apparatus comprising links, pivot pins connecting the links to form an endless series chain; said respective links being shaped to form a pair of oppositely facing pocket sections in an upwardly open horizontal reach of said chain, the pocket section of one link as toward the pocket section of the adjacent link being complementary thereto at abutting position therebetween and shaped to provide an outwardly flaring entrance to the pocket for receiving a supply of granular material having voids between the granules thereof, pivotally mounted plunger means, a mounting chain device locating the plunger means normally for a reach spaced from and parallel to the upwardly open pockets, a rigid opposing sustaining holder for the horizontal reach of the chain, thereby to lock the mold pockets therealong in closed position, a positive guide for directing the plunger means to rock relatively to the device and be self-centering in entering into the pockets as locked closed by the holder for initially compressing the material into the pockets, pivoted arm controlling means operable further to increase the extent of travel of the plunger means into the pockets by yieldably thrusting the plungers in succession and gradually deeper into the pockets during the continuation of the progress of the pockets along the reach, thereby to reduce still more said voids in said pockets, and yieldable adjusting means coacting with the free end of the pivoted arm controlling means for thereby forcing the plunger means into the pockets.

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