

Nov. 30, 1926.

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J. MORRISON
GLASS FEEDING APPARATUS

Filed Oct. 14, 1922

4 Sheets-Sheet 1

Fig. 1.

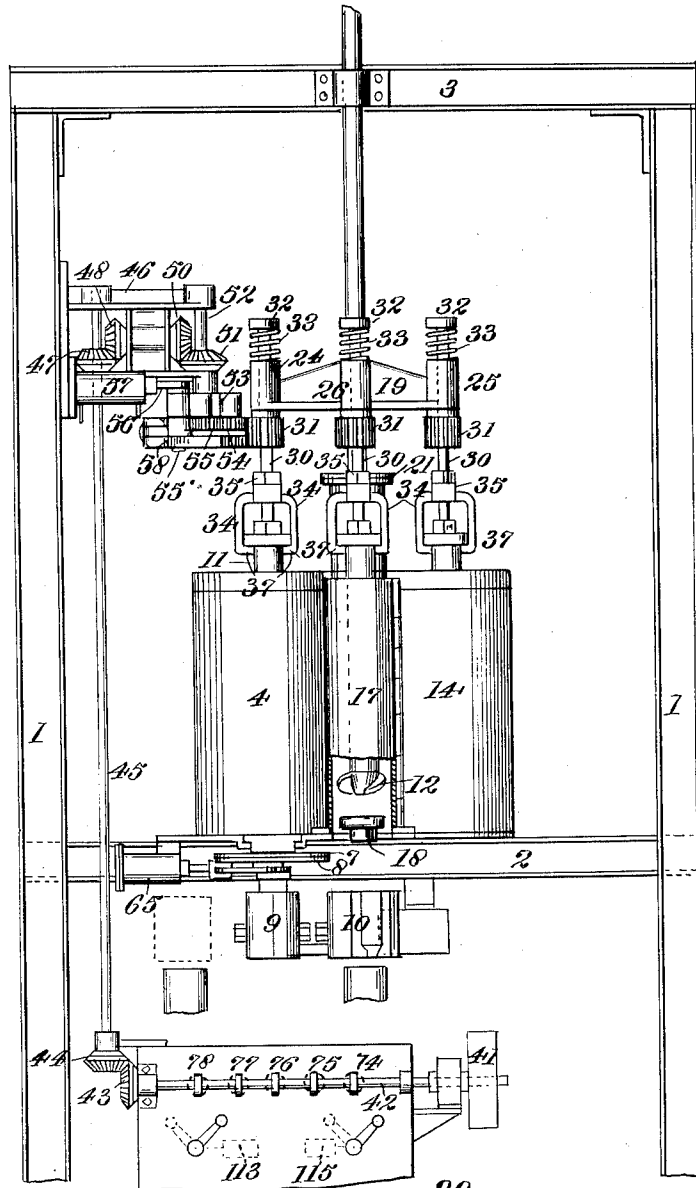
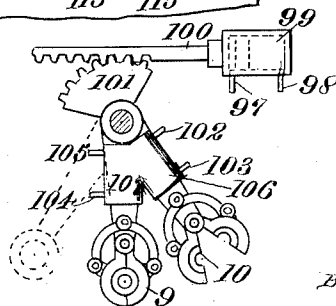


Fig. 2.



Inventor.
J. Morrison.
By *Ciccent Follen*
attorneys

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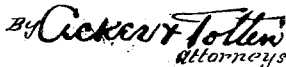
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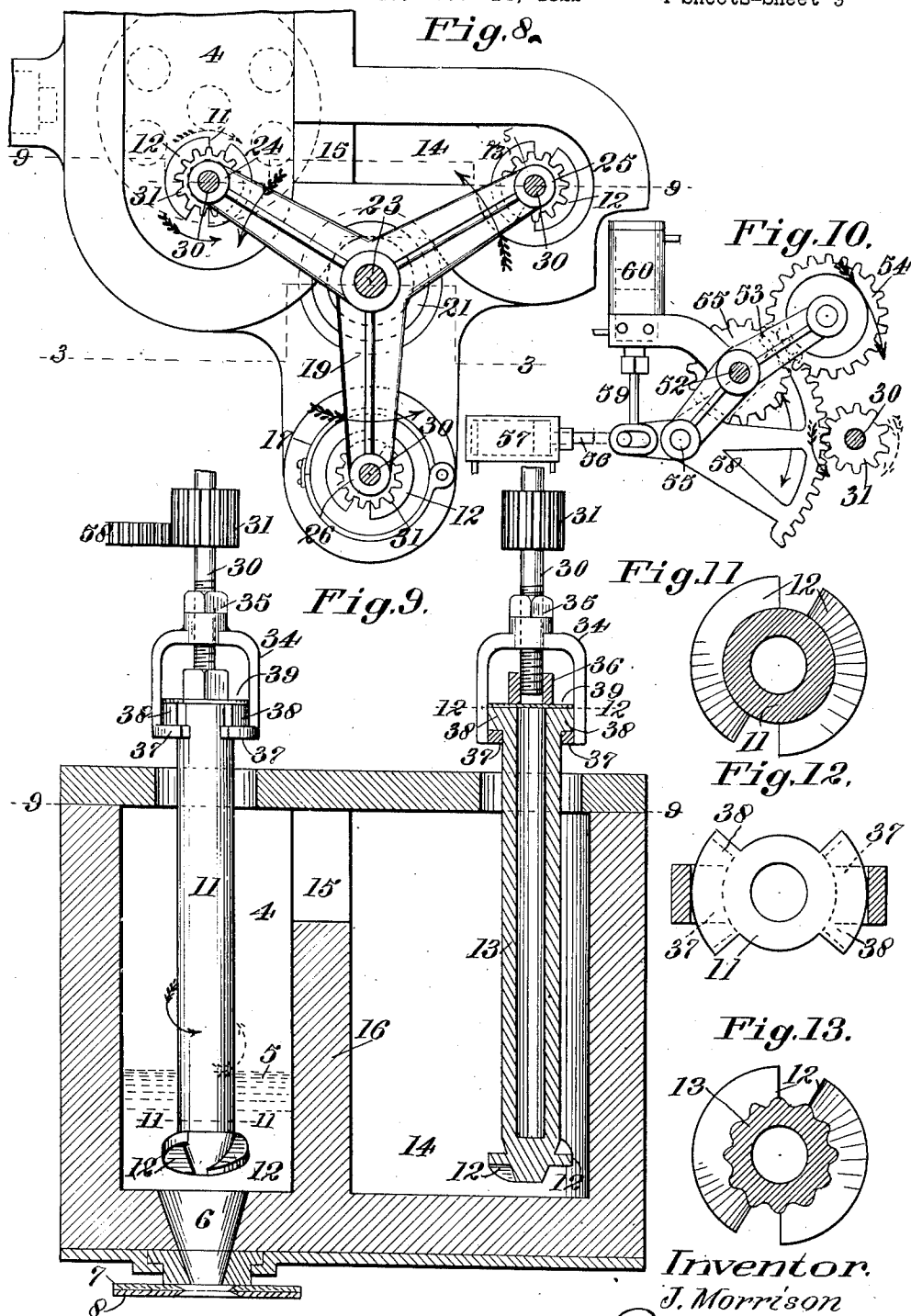
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4 Sheets-Sheet 3



Inventor.
J. Morrison
By *Acres & Totten*
Attorneys

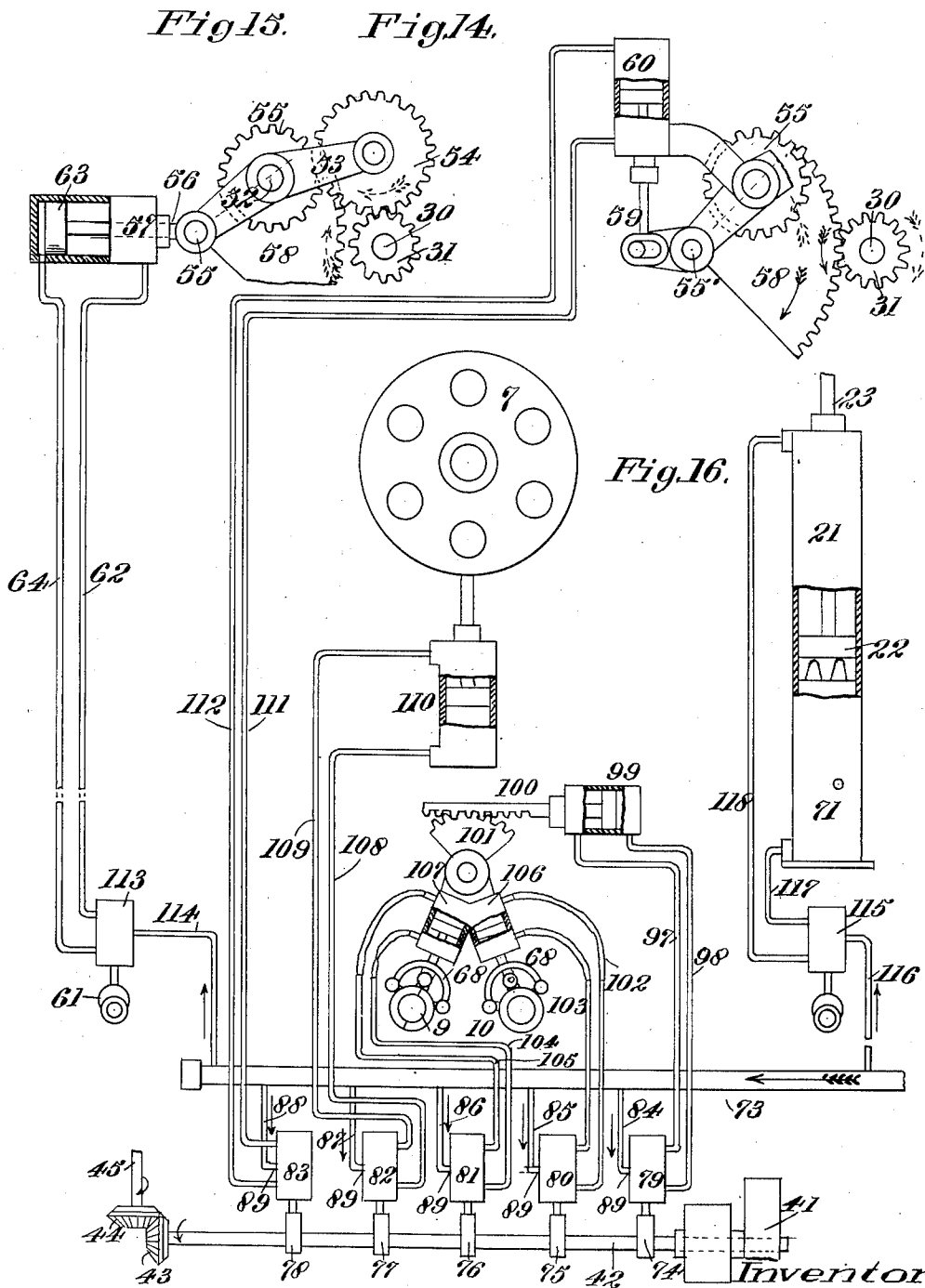
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J. MORRISON
GLASS FEEDING APPARATUS

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4 Sheets-Sheet 4



Inventor
J. Morrison
By *Acres & Totten*
Attorneys.

UNITED STATES PATENT OFFICE.

JAMES MORRISON, OF SAN FRANCISCO, CALIFORNIA.

GLASS-FEEDING APPARATUS.

Application filed October 14, 1922. Serial No. 594,541.

The hereinafter described invention relates generically to an apparatus for automatically feeding molten material for the manufacture of articles therefrom, although the same is designed, illustrated and described more particularly for use in connection with the handling and controlling of the feed of molten glass, and the invention pertains more particularly to an automatic device so arranged and operated that a high degree of efficiency is obtained in the manipulation of the body of molten material and in the segregation of portions thereof for the delivery of the same for the forming of articles therefrom in suitable molds or otherwise.

A principal object of the invention resides in means for automatically agitating and moving a mass of molten material whereby a uniform temperature and consistency is maintained in the mass during the period of time it is necessary to manipulate it in the process of manufacturing articles therefrom.

Another principal object of the invention resides in manipulative means for changing or modifying the agitating means whereby the mass of molten material is agitated in a special way to suit varying conditions of manufacture and requirements during a periodical run of material.

Another principal object of the invention resides in automatic means, manipulatively controlled for removing and changing the agitating elements without in any manner dismantling or disarranging the machine proper.

Another object of the invention resides in providing graduated warming chambers wherein the agitating elements are given a preliminary warming and tempering, as it were, so that when a change of agitating elements is made, the new element entering the mass of molten material will have been previously pre-heated to approximately the same temperature as the molten material and will therefore not produce any cooling or chilling effect when entering therein.

Another object of the invention is to provide flexible, automatically and manually controlled operating units for moving and controlling the various parts and combina-

tions of parts for the proper functioning of the organized apparatus in proper timed relation.

With such objects in view, as well as other advantages which may be incident to the use of the improvements, the invention consists in the procedure, and in the parts and combinations thereof hereinafter set forth and claimed, with the understanding that the several necessary elements constituting the same may be varied in proportion and arrangement without departing from the nature of the invention.

In order to make the invention more clearly understood there are shown in the accompanying drawings means for carrying the same into practical effect, without limiting the improvements in their useful applications, to the particular construction which, for the purpose of explanation, have been made the subject of illustration.

In the drawings accompanying this specification like numerals of reference refer to like parts of the various views.

Figure 1 of the drawings accompanying this specification is a vertical side elevation of an assembled machine showing the various parts and operating elements in their respective relations.

Figure 2 is a plan detail of the molds in which articles are formed and the operative means for manipulating and controlling the same.

Figure 3 is an enlarged, partly sectional elevation, showing the mechanism for automatically elevating and lowering the molten material agitating members for inspection or changing, and is taken on line 3—3 of Figure 8.

Figure 4 is a sectional detail taken on line 4—4 of Figure 5 showing the construction and arrangement of the cut-off mechanism for separating measured charges of molten material from the mass, for the forming of articles therefrom.

Figure 5 is a plan partly in section of the cut-off mechanism and its operating unit and connections.

Figure 6 is a section on line 6—6 of Figure 3, and illustrates the clutching members for resisting rotary tendencies imparted to the agitator mechanism when the machine is in

operation, and aligns the several agitator elements in their respective positions.

Figure 7 is a sectional view of one of the flexible operating units, that is operated and controlled by fluid means.

Figure 8 is a plan of the spider mechanism for carrying and controlling the agitating elements.

Figure 9 is a sectional elevation taken on line 9—9 of Figure 8 showing that part of the device lying directly under the spider of Figure 8 and shows two of the agitating elements in their respective operative positions, one element in the boot with its lower end immersed in a body of molten material and the other element in the warming chamber adjacent thereto.

Figure 10 is a plan detail of the mechanism for imparting agitating motion to the agitating element suspended in the boot and in the molten material.

Figure 11 is a cross sectional detail taken on line 11—11 of Figure 9 of the lower end of the agitating element in the boot.

Figure 12 is a cross sectional detail taken on line 12—12 of Figure 9 of the upper end and connections of one of the agitating elements.

Figure 13 is a cross sectional detail similar to Figure 11 but showing a modification of structure of the body portion of an agitating element, whereby the body is fluted or corrugated to thereby assist in the agitating action.

Figure 14 is a diagrammatic view showing the various connections of the several stations with the automatic controlling units all arranged in diagram form for easy illustration and comparison.

Figure 15 is a diagrammatic view showing the operative elements of the mechanism of Figure 10.

Figure 16 is a diagrammatic view showing the operative element for controlling the lifting of the spider and suspended parts of Figure 8.

The numeral 1 represents two side frame members, 2 is a lower cross tie member and 3 is an upper cross tie member, these uniting the side frame members 1 form a rectangular frame structure on which is mounted the mechanism comprising the machine of my invention.

The general plan of this organized apparatus comprises a chamber or boot 4 in which is deposited a suitable quantity of molten material, in this case molten glass, represented by numeral 5 Figure 9.

In the bottom of the chamber, or boat 4, is an outlet orifice 6 through which molten glass is passed through shearing or separating disks 7 and 8, into transfer cups or holders 9 and 10.

In order to handle molten materials efficiently and successfully it is necessary and

desirable that the molten material is stirred or agitated in such manner and in such time that a fairly uniform temperature and consistency is maintained during the period of actual operation, and to be stirred or agitated in a different manner when operations cease for a period, but are not completely terminated for the time.

Agitating devices heretofore provided for machines of this character have been more or less inefficient on account of their limited capacity to meet the varying conditions of modern manufacturing demands. It is desirable that the mass of molten material be moved about in the chamber and not simply stirred, and to effect such an action I have provided an agitating member of a special construction, wherein it is provided with propelling blades which act to move the material about the chamber. The agitating member is designated by numeral 11, Fig. 9, and the propelling blades on its lower end by numeral 12.

This agitating member 11 is made of a highly refractory material, such as fire-clay or some similar substance, and in continued operation these agitators become broken and must be replaced before operations can be continued. Heretofore this replacement required considerable time and the dismantling to a certain extent of parts of the machine and was quite a laborious task and quite expensive on account of the loss of glass.

In the present structure I have aimed to provide an agitating device that is specially mounted and operated so that molding operations can cease for a period and the molten mass will be kept in condition for immediate resumption of operation within any reasonable period of time, and I accomplish this result in the following manner and by means of the following mechanism.

Whenever molding operations are in progress one agitating member is immersed in the molten mass 5 in the chamber 4. An auxiliary agitating member 13 is held in reserve in the heating chamber 14, which derives its heat through an opening 15 in a wall 16 separating the two chambers 4 and 14. On account of this location and the heat passing into the chamber 14 from the mass of molten material in the chamber 4, the auxiliary agitator 13 is maintained at very near the temperature of the active agitator 11 in the chamber 4, and is thus in position and condition to be almost immediately transferred from the warming chamber to the operating chamber in case of accident of any kind to the active agitator 11.

If it becomes necessary to make this transfer it is also necessary that another agitator member be placed in the warming chamber for immediate use in case of further accident. This I accomplish by having a third agitating member in reserve and held in an

outside warming chamber 17 Fig. 1, which chamber is heated by a suitable arranged gas burner 18.

This general arrangement provides three 5 agitating members at all times quickly available for use during the period of a run and insures a continuous operation, or at least so nearly continuous as to make the short stop necessary to make the transfer of agitators as described, of no serious consequence.

The mechanism for handling the agitators as described is clearly illustrated in Figs. 1, 3, 8 and 9.

15 A three armed spider 19 is mounted for vertical reciprocation, directly over the chambers 4, 14 and 17, and is controlled and moved by means of an operating unit 20 arranged centrally within the area of the 20 chambers 4, 14 and 17 and comprises a cylinder 21, a piston 22, and a piston rod 23, the rod 23 being in turn secured to the spider 19 through suitable connections with the hub thereof. On the ends of each of the 25 arms of the spider 19 are hubs 24, 25 and 26. The hub 24 carrying connections and driving mechanism for holding and controlling the agitator 11, the hub 25 holding and controlling the agitator 13, and the arm 30 26 holding and controlling the agitator 27. These three agitators are thus mounted and controlled by the spider so that the whole agitating apparatus can be moved and handled as a single unit structure.

35 Figs. 1 and 9 show this mechanism in its normal operative position, and Fig. 3 shows it in an elevated position, which is the position it assumes when a transfer of agitating members is being made as described.

40 The elevated position of the mechanism in Fig. 3 is accomplished in the following manner:—

The cylinder 21 of the operating unit 20 45 is provided with an inlet 28 through which fluid pressure means is admitted under the piston 22 when in its lowermost position as in Figs. 1 and 9. This pressure means immediately elevates the whole agitator mechanism to the position of Fig. 3 and thereby 50 withdraws the three agitating elements 11, 13 and 27 from their respective normal positions, and disconnects the element 11 from its driving mechanism so that the spider 19 and the agitator elements 11, 13 and 27 and 55 connections can be manually rotated on the rod 23.

This rotation of the elements on the rod 23 changes the respective positions of the agitator elements 11, 13 and 27 as follows:—

60 We are assuming that the element 11 has become broken or damaged in some manner during a run and must be replaced with a perfect agitator. With the agitator mechanism in the position of Fig. 9, manual application will easily rotate the entire mecha-

nism on the rod 23, so that the broken element 11 will swing around to the position of element 27, the element 13 will swing into the position of element 11 and element 27 will swing around to the position of element 13. This places the pre-heated element 13 in position to enter the chamber 4, the element 27, which has had a preliminary heating in the chamber 17, in position to enter the pre-heating chamber 14, and the 75 broken element 11 over the chamber 17. At this point the broken element 11 may be removed from its holdings and replaced with a new element or, this change may be made after lowering the agitators. As soon 80 as this is accomplished the entire agitator mechanism is lowered into its normal position when the several elements will enter their respective places and the machine is ready for a continuation of the interrupted 85 operation.

The lowering of the agitator mechanism is accomplished in a like manner to raising it. Pressure means is admitted over the top of the piston 22 through the opening 29, 90 which acts to move it in a downward direction and place it in normal position of operation.

In the agitation of a mass of molten glass, it is desirable that the agitator move in 95 more than one continuous direction. To provide for such an action I provide mechanism that will impart alternate directions of rotation to the agitator 11 which action has the effect of creating a movement of 100 the mass of molten glass that tends to maintain a uniform temperature throughout the mass. By reference to the construction of the propeller blades 12 on the lower end of the agitator 11 it will be observed that 105 when the agitator is rotated in one direction the action of the propellers will be to raise the mass of molten material, while if the agitator is rotated in the opposite direction the action will be to move the mass of material downward. This action is accomplished through the following mechanism.

Figs. 3 and 10 will best illustrate the mechanism now to be described.

The hub 24 of the spider 19 carries a 115 spindle 30, on which is splined a pinion 31 resting directly under the lower face of the hub 24. The upper end of the spindle 30 is provided with a collar 32, while between the collar 32 and the upper surface 120 of the hub 24 is a spring 33. This spring 33 affords a yielding suspension to the agitators. The lower end of the spindle 30 carries a yoke 34, adjustably secured to the spindle 30 by means of a nut 35. The end 125 of the spindle 30 extends through the yoke 34 and the threaded end thereof is provided with a nut 36, Fig. 9. The lower end of the yoke 34 is provided with inwardly extending engaging lugs 37, which engage 130

under the interrupted flanges 38 of the agitators 11, 13 and 27. After these agitators are placed in the yokes a plate 39 is placed over the end and the nut 36 tightened thereon to hold all in a fixed relation. Fig. 12 shows a plan of how the flanges 38 of the agitators are supported and the sectional view in Fig. 9 shows a side elevation of the arrangement.

When the assembled parts are in the position shown in Fig. 1 they are connected up for operation.

We have said the agitator member 11 was given an alternating rotative action, this is accomplished in the following manner:—

See particularly Figs. 1 and 3. Arranged in a suitable location relative to the machine proper is a main drive unit 40, comprising a pulley 41, receiving power from a source not shown, a transverse shaft 42, carrying on the end opposite the pulley, a bevel gear 43, meshing with a companion gear 44, carried by a vertical shaft 45, extending upward and finding bearing in a housing 46 bolted to the inside of one of the frame members 1. This shaft 45 has mounted on its portion within the housing 46 a bevel gear 47, meshing with a companion gear 48. A horizontal shaft 49 located in the housing 46 carries the bevel gear 48 and the bevel gear 50, which gear meshes with a companion gear 51, which in turn is carried by a short vertical shaft 52 carried by the housing 46. The lower end of the shaft 52 carries the arm 53, while the outer end of the arm 53 carries a gear 54 meshing with gear 55 on the lower end of the spindle 52. The opposite end of the arm 53 carries a hub in which is mounted a short spindle 55', the upper end of which is operatively connected with the end of a short piston rod 59 working from a power unit 60. The lower end of the spindle 55 carries a quadrant 58, which is given alternate rotary motion through movement of the rod 59 operated by the power unit 60. The quadrant 58 meshes with the gear 31 on the spindle 30 controlling the agitator 11, so that as the quadrant 58 is given oscillatory rotary motion, the gear 31 is rotated first in one direction and next in the opposite direction, thus transmitting to the agitator 11 the alternate movements referred to.

This alternate rotary action of the agitator 11 is sufficient in operation to lift the mass of molten material away from the opening 6 during one of its oscillations and to force the mass of material through into the opening 6 during its other movement. This manner of operating the agitator is proper for continued operation of the machine where measured quantities of material are delivered and severed with regularity. When however it becomes necessary to suspend actual operation of forming articles,

but it is necessary to keep the machine in operation to keep the molten mass agitated it is desirable that the agitator 11 be moved continuously in one direction, and that being such that the action of the propellers will be to lift the mass of material away from the opening 6 and thus prevent a chilling and cooling of any material that may settle therein during the period of inactivity. This highly desirable condition is created through the medium of an auxiliary gear arrangement that can be brought into operation at will and by easily manipulated mechanism, manually controlled. This mechanism comprises the arm 53, gears 54 and 55, piston rod 56 and operating unit 57. When it is desired to suspend the making of articles for a short time and operate the agitator in the one direction only, as mentioned, the operator manually manipulates the control member 61, Figs. 7 and 15 whereby pressure fluid means is admitted to the operating unit 57 through the pipe 62, which acts to move the piston 63 in the unit 57, in a direction to swing the arm 53 into the position of Fig. 15, shown in diagram. This position draws the quadrant out of mesh with the agitator gear 31 and places gear 54 into mesh with the agitator gear 31, and since the gears 54 and 55 are directly connected through gear trains with the source of continuous power the gear 31 and with it the agitator 11 will now rotate in one direction only as described. As soon as it is desired to again commence the making of articles the operator places the control member 61 in the reverse position, when fluid pressure means will be admitted to the pipe line 64, the piston 63 will be moved to the other end of the cylinder 57 and the arm 53 will be moved into its normal idle position as in Fig. 10, the quadrant 58 will at the same time be again brought into mesh with the gear 31 of the agitator 11 when the alternate rotary movements of the agitator will again prevail.

This cycle of operation may be repeated and continued at will and has been found so effective and practical that there is now practically no loss of time or material in the regular operation of the machine, as has always been the case heretofore.

Articles of varying shapes and sizes may readily be produced by this machine, the only change necessary to do this being the provision of suitable molds and a proper adjustment of the cutting off mechanism.

The cutting off mechanism consists of two plates, having shearing apertures and lying one above the other in frictional engagement. When material is being discharged from the chamber 4 through the orifice 6, the shearing apertures of the plates 7 and 8 are lying in open relation directly under the aperture 6 so that the material will pass through this opening into the molds 9 and 10, either of

which may be in position. When the time to cut off the charge of material comes the disks 7 and 8 are given opposite directions of rotation which causes the shearing apertures to pass and thus sever the measured quantity of material from the mass. This shearing action of the disks 7 and 8 is produced through the medium of a pawl and ratchet mechanism. Fig. 5 illustrates this mechanism in which 65 represents a power unit having a reciprocating piston 66, a piston rod 67, spring controlled pawls 68, one mounted in a plane above the other as is best shown in Fig. 4, the hooked ends of the pawls engaging ratchets 69 and 70 on the disks 7 and 8.

The piston 66 in the power unit 65 is automatically controlled and moved in timed relation to the other operating parts of the machine, so that at accurately timed intervals the cut off mechanism operates to sever the measured quantity of material for one mold.

The effect of imparting rotation to the entire agitating mechanism comprising the spider 19 and its attendant parts when in operative position is counteracted through clutching members 71 shown in Figs. 6 and 3, which are firmly secured to the cylinder 21 and engage the notched end of the piston 22 at 72. The piston 22 is shown in dotted lines as in engagement with the members 71, in Fig. 3.

I will follow now with a description of the diagrammatic views 14, 15 and 16.

In the operation of this machine I have preferred to use compressed air, but I wish it understood that I can use any pressure fluid means available other than air. I will describe the various parts as operated by air pressure.

In Fig. 14, 73 represents a main pipe line supplying air to all of the operating units, the source of air supply not being shown, but would consist of any well known and used compressor suitable for the purpose.

Arranged on the main operating power shaft 42 are a series of control members 74, 75, 76, 77 and 78 which are the well known form of eccentric or cam best suited for this purpose.

Arranged in working relation with each of the control members is a valve unit shown in detail in Fig. 7, these units are all of the same construction so that the one view serves for all.

These units are designated by numerals 79, 80, 81, 82 and 83. It will be noted that each of these valve units has air connection with the main air supply pipe 73 through connections 84, 85, 86, 87 and 88, entering the same through the openings 89. The details of the valve construction are clearly illustrated in Fig. 7 and consists of a valve housing 90 having

distributing ports 91 and 92 for admitting air under pressure to either side of the piston 93 and thus through the housing out of ports 94 and 95 from where it is conveyed to the various power units that operate the several mechanisms. The pistons 93 are not moved by air pressure, as would appear at first glance. The piston of Fig. 7 is moved into the position shown by the control member 61 and is returned to the opposite position by means of the spring 96. The movement of this piston is merely for the control of the distribution of the air to one side or other of the operating power units to be described.

The valve unit 79 controls the air supply through pipes 97 and 98 to the power unit 99, which through its piston and rack 100, and quadrant 101, controls the positioning of the molds 9 and 10 in relation to the cut off mechanism members 7 and 8. The reciprocating motion imparted to the rack 100 tending to rock the molds to and fro and position first one and then the other under the plates 7 and 8 to receive respectively a charge of molten material with which to form an article.

The valve units 80 and 81 through the pipe connections 102, 103, 104 and 105 serving to operate the power units 106 and 107 which control the opening and closing of the molds 9 and 10.

The valve unit 82 through the pipe connections 108 and 109 supplies air to the power unit 110, which in turn operates the shear plates 7 and 8.

The valve unit 83 through the pipe connections 111 and 112 supplies air to the power unit 60 which in turn operates the quadrant 58 and imparts the rocking motion thereto that in turn operates the agitator gear 31 and the agitator 11 as has been described.

The valve unit 113 receives air through pipe 114 and distributes the same through pipes 62 and 64 to the power unit 57 as has been described.

The valve 115 receives air through pipe 116 and distributes the same through pipes 117 and 118 to the power control member 21 that controls the movement of the agitating mechanism as has been described.

In this diagrammatic view all of the valve units have been shown in the same operative positions, which of course does not occur in actual practice, as the timing of the several valves is such that the various operating parts of the entire machine will operate in proper timed relation to produce the desired results in the continuous production of molded articles. The position and arrangement of the various power units in connection with the mechanism they operate and control is not according to actual construction and arrangement of an operative ma-

chine, they have been placed as shown in the drawings as possibly better showing their operation and connections than if they were placed exactly as would occur in an operative structure.

I claim:—

1. A machine for the handling of molten or plastic material comprising a chamber for containing said molten or plastic material, an agitator member in said chamber for agitating said plastic material, an auxiliary pre-heating chamber and an auxiliary agitator member in said pre-heating chamber, both of said agitator members being arranged for transfer from and to said chambers.

2. A machine for the handling of molten or plastic material comprising a chamber for containing said molten or plastic material, an agitator member in said chamber for agitating said plastic material, a multiple number of pre-heating chambers, auxiliary agitator members in each of said auxiliary pre-heating chambers, all of said agitator members being arranged for transfer from and to all of said chambers.

3. A machine for the handling of molten or plastic material comprising a chamber for containing said molten or plastic material, an agitator member in said chamber for agitating said plastic material, an auxiliary pre-heating chamber, an auxiliary agitator member in said pre-heating chamber, controllable means for transferring said agitators to and from said chambers.

4. A machine for handling molten or plastic material comprising a chamber for containing molten or plastic material, an agitator member mounted for rotation within said chamber, said agitator member having blades or vanes disposed thereon for producing a movement of said molten or plastic material in said chamber, and an auxiliary agitator member arranged adjacent said first agitator member for easy transference to replace said first agitator member.

5. A machine for handling molten or plastic material comprising a chamber for containing molten or plastic material, an agitator member mounted for rotation within said chamber, said agitator member having blades or vanes disposed at other than a right angle to the axis of said agitator member, and an auxiliary agitator member mounted for rotation and arranged for easy transference to replace the first said agitator member.

6. A machine for handling molten or plastic material comprising a chamber for containing molten or plastic material, an agitator member mounted for rotation within said chamber, said agitator member having vanes or blades disposed thereon for producing a movement of said molten or plastic material in said chamber, an auxiliary agi-

tator member arranged adjacent said first agitator member and mounted for easy transference to replace said first agitator member, an orifice in said chamber for the discharge of material therefrom and molds for receiving said material when discharged.

7. A machine for handling molten or plastic material comprising a chamber for containing said material, an agitator member mounted for rotation within said chamber, said agitator member having vanes or blades disposed thereon for agitating said material in said chamber, an auxiliary agitator member arranged adjacent said first agitator member and mounted for easy transference to replace said first agitator member, an orifice in said chamber for the discharge of material therefrom, shearing devices for severing a measured quantity of material after having passed through said orifice and forming molds for receiving said measured quantity of material.

8. A machine for handling molten or plastic material comprising a multiplicity of agitator members arranged in operative relation with a multiplicity of chambers, each of said chambers containing one of said agitator members, controllable means for transferring said agitator members from chamber to chamber.

9. A machine for handling molten or plastic material comprising a multiplicity of agitator members arranged in operative relation with a multiplicity of chambers, each of said chambers containing one of said agitator members, controllable means for transferring said agitator members from chamber to chamber, molten or plastic material contained in one of said chambers and molding means adjacent said chamber for receiving material therefrom.

10. A machine for handling molten or plastic material comprising a multiplicity of agitator members arranged in operative relation with a multiplicity of chambers, each of said chambers containing one of said agitator members, controllable means for transferring said agitator members from chamber to chamber, molten or plastic material contained in one of said chambers, heating means for the other of said chambers whereby the agitator members contained therein are given a preliminary heating to being transferred to other chambers.

11. A machine for handling molten or plastic material comprising a multiplicity of chambers, one containing molten or plastic material, a multiplicity of agitator members arranged in operative relation with said chambers, each of said chambers containing one of said agitator members, controllable means for transferring said agitator members from chamber to chamber, heating means for the other of said chambers whereby the agitator members contained therein

are given a preliminary heating prior to being transferred to other chambers, molding means adapted to receive material from said chamber containing material and from
5 articles therefrom.

12. A machine for handling molten or plastic material comprising a multiplicity of chambers arranged in triangular form, a multiplicity of agitator members also arranged in triangular form and adapted to
10 placement within said chambers, each of said agitator members being mounted for axial rotation and also for planetary rotation.

13. A machine for handling molten or plastic material comprising a multiplicity of chambers and a multiplicity of agitator members arranged for placement within
15 said chambers, each of said agitator members being mounted for axial rotation and also for planetary rotation with automatic means for giving axial rotation to one of said agitator members.

14. A machine for handling molten or plastic material comprising a multiplicity of chambers and a multiplicity of agitator
25 members arranged for placement within said chambers, each of said agitator members being mounted for axial rotation and also for planetary rotation, automatic means for imparting axial rotation to one of said agitator members, automatic and manually operated means for imparting planetary rotation to all of said agitator members.

15. A machine for handling molten or plastic material comprising a multiplicity of chambers one of which contains molten or plastic material, a multiplicity of agitator members arranged for placement within said
35 chambers, each of said agitator members being mounted for axial rotation and also for planetary rotation, automatic means for imparting axial rotation to one of said

agitator members, manually controllable means for imparting planetary rotation to all of said members, molding means arranged adjacent the said chamber containing the said plastic material and adapted to receive material therefrom for the forming of articles.

16. An apparatus for the handling of molten or plastic material, the same comprising a container for molten or plastic material, a vertically movable agitator member situated within the container, mechanism for imparting alternate direction of rotation to said agitator member, means disposed on the end of said member for raising and lowering material within the container in accordance with the direction of rotation imparted to the agitator member, and fluid pressure actuated means adapted to control the movements of the agitator member.

17. An apparatus for the handling of molten or plastic material, the same comprising a chamber for containing molten or plastic material, and provided with a discharge outlet, an agitator member disposed within said chamber, primary means for imparting alternate direction of rotation to said member, means on the end of the agitator member for raising and lowering the material contained within the said chamber in accordance with the direction of rotation imparted to said member, secondary fluid actuated mechanism for imparting continuous rotation in one direction to the agitator member on the primary means for the operation thereof being thrown out of operation, and means associated with the discharge outlet of the material holding chamber for receiving measured quantities of material therefrom.

In testimony whereof I have signed my name to this specification.

JAMES MORRISON.