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APPARATUS FOR MOLDING PULP

Filed May 14, 1952

2 Sheets-Sheet 1

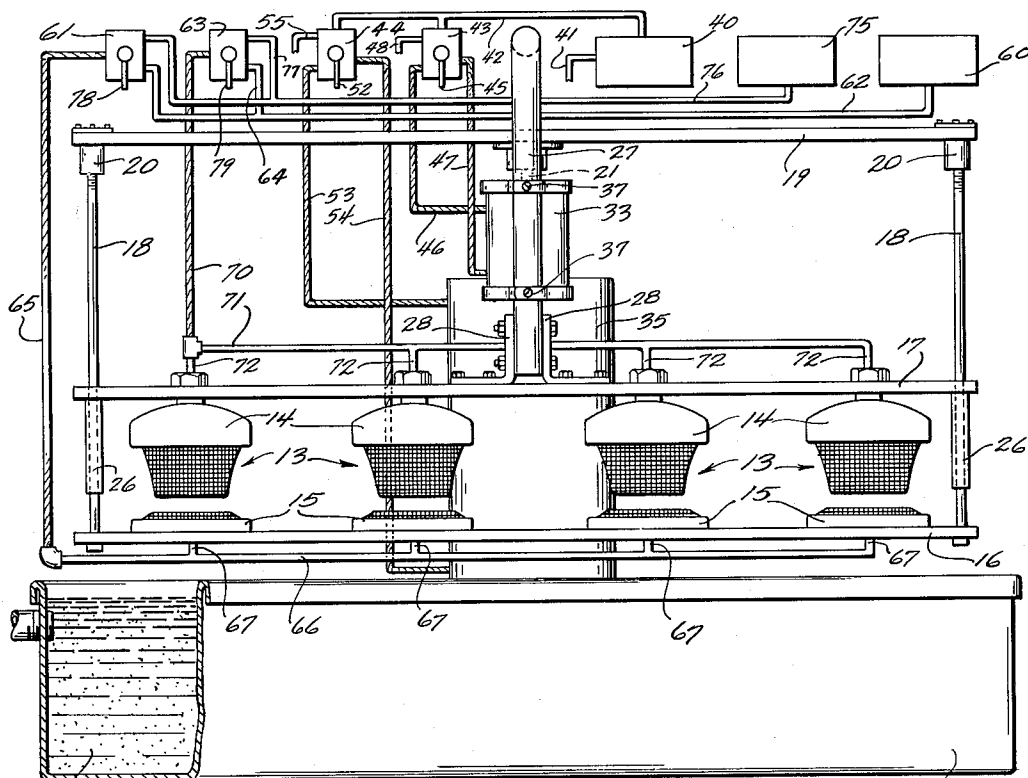


Fig. 1

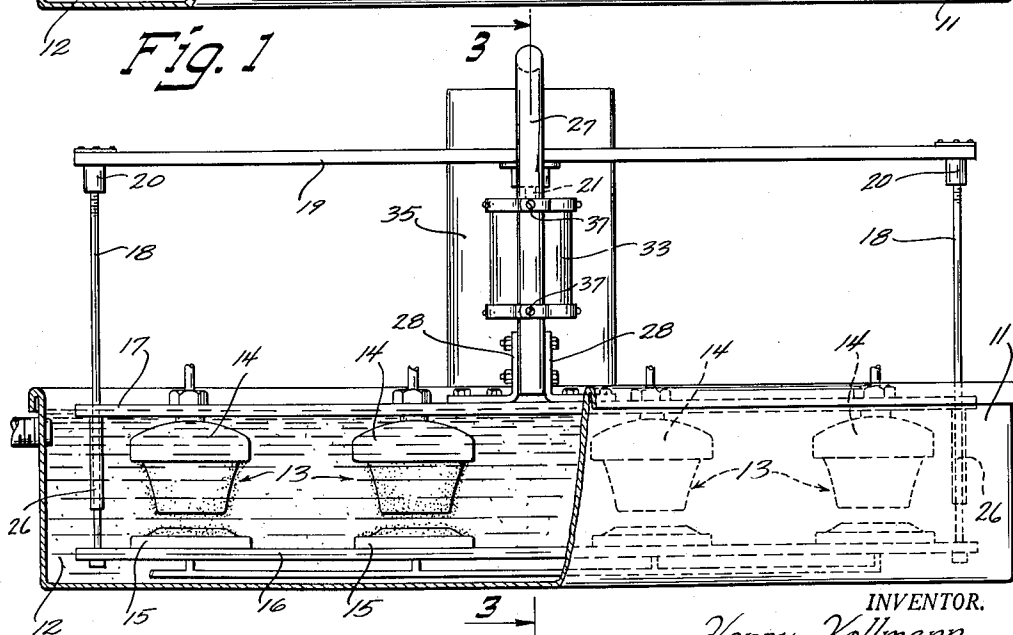


Fig. 2

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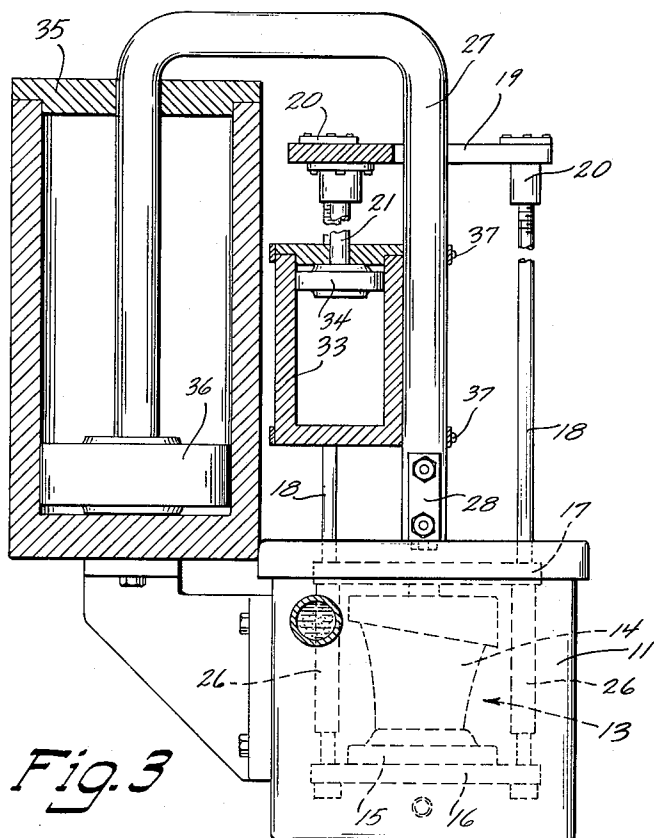
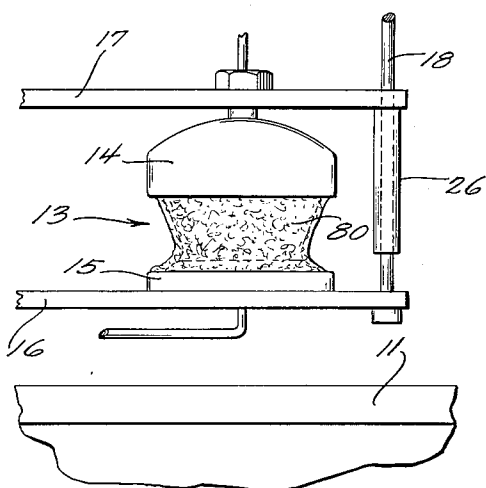
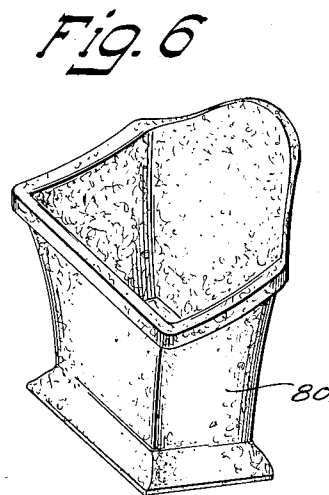
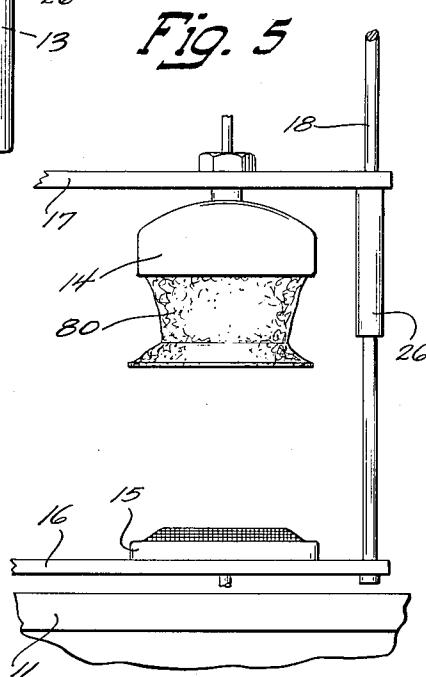


Fig. 4

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2,748,672

APPARATUS FOR MOLDING PULP

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1 Claim. (Cl. 92—54)

This invention relates generally to an improved apparatus for molding pulp into a particular shape, and especially to an improved machine for molding papier-mâché vases.

Papier-mâché vases, which are formed from a paper pulp, have become very popular for displaying floral bouquets because of the desirable qualities of the material, and the inexpensiveness of the vases. Such vases take the usual form in having a large opening at the top and tapering inwardly to the base which extends outwardly to provide stability to the vase. Because the base and top opening are larger than the central portion of the vase it cannot be formed as a unit on a single mold since the mold could not be removed without destroying it. It has therefore been the general practice to provide a mold for the body or upper portion of the vase upon which the paper pulp is formed and utilize a sand core for the base. The sand core is completely covered with the paper pulp to form a separate base, which is secured to the body portion of the vase to complete the unit, the sand core becoming an integral part of the vase.

The production of the sand core itself for use in manufacturing such vases represents a substantial portion of the cost of the vase and considerable labor is involved in fabricating such a base containing a sand core. In addition, since the sand becomes an integral although invisible part of the vase, it greatly increases its weight, resulting in higher shipping costs, which is an important factor in the total cost of an item of this nature.

It is therefore a general object of the present invention to provide an improved apparatus for molding a papier-mâché vase in which the necessity of a sand core for the base is eliminated.

Another object is to provide an improved apparatus for molding the base of a papier-mâché vase integrally with its body.

Another object is to provide an improved apparatus for molding vases of the usual configuration from paper pulp, in which the base is formed integrally with the body of the vase, without the use of a core, and without sacrificing either stability or rigidity.

A further object is to provide an improved process for manufacturing papier-mâché vases which substantially reduces the cost of the article.

According to this invention papier-mâché vases are produced from paper pulp in the usual manner on a mold formed of a fine mesh screen or wire cloth by drawing the pulp on the mold with suction applied to the interior of the mold, while it is immersed in the pulp. However, instead of using a single mold and a sand core for the base, the process comprising the present invention utilizes two molds, one for the body of the vase, and another for the base, eliminating the necessity of a sand core for the base. This is accomplished by first applying paper pulp containing a suitable binder to the two molds individually, the molds being separated from each other. After both molds have received a layer of paper pulp, they are

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brought together while immersed in the pulp, with the body mold on top of the base mold, in the same relationship as exists in the completed vase. Then an additional layer of pulp is applied over the entire unit while the two molds are in position to form a complete vase. When sufficient pulp has been applied to the molds they are removed from the pulp as a unit and the excess moisture is drawn out of the pulp by again applying the suction to the interior of the molds. Upon removing the excess moisture from the pulp, but while it is still damp, the molds are removed, as the pulp then has sufficient body to retain the shape into which it has been formed. They are then placed in an oven to be dried, and the completed article is a single unit, the base being integral with the body of the vase.

The foregoing and other objects of the invention, which will become apparent from the following detailed specification setting forth an illustrative embodiment, may be achieved by carrying out the process with the apparatus depicted in and described in connection with the accompanying drawings, in which:

Figure 1 is a view partly in front elevation and partly diagrammatic, of apparatus provided for molding papier-mâché vases in accordance with the process of the present invention, with the molds being shown withdrawn from the pulp;

Figure 2 is a view in front elevation of the apparatus depicted in Figure 1, but with the molds immersed in the pulp and the hydraulic circuit omitted;

Figure 3 is a view in vertical section taken along the plane represented by the line 3—3 in Figure 2, with the molds still immersed in the pulp but the base mold and body mold drawn together to form a completed vase;

Figure 4 is a fragmentary view in front elevation of the apparatus illustrated in Figure 1, illustrating the molds withdrawn from the pulp after a layer of pulp has been applied, the base mold and body mold being united;

Figure 5 is a fragmentary view in front elevation, substantially identical to the view in Figure 4, except that the base mold has been separated from the body mold; and

Figure 6 is a perspective view of the completed vase removed from the molds.

Referring now more specifically to the drawings, there is shown a particular apparatus especially adapted for carrying out the process of the present invention. The apparatus comprises a vat 11 for containing a paper pulp 12 to which a suitable binder has been added for the purpose of causing the mixture to form a rigid mass of substantial strength when dried, the resulting material being commonly known as papier-mâché. The purpose of the illustrated apparatus is to enable the paper pulp to be formed into the shape of a vase which may be dried, to produce a papier-mâché vase of simple but sturdy construction.

Above the vat 11 there are supported a plurality of unit molds 13 for molding the vases into the desired shape, the illustrated embodiment showing four such molds, although it is to be understood that any reasonable number may be provided, depending of course, on the amount of production required. Each of the unit molds 13 comprises two individual molds 14 and 15, the mold 14 being referred to as the body mold, since it forms the upper portion or body of the vase, while the mold 15 is referred to as the base mold, as it forms the base of the vase.

The base molds 15 are mounted on a platform 16 while the body molds 14 are suspended from a plate 17 in operating relationship to their associated base molds 15. The platform 16, carrying the base molds 15, is supported by four rods 18 which depend from a bracket 19, being secured thereto by four connectors 20 fixed to the bracket 19 at its respective corners and having

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threaded engagement with the upper ends of the rods 18. The bracket 19 in turn is secured to the end of a piston rod 21 to move with it for producing vertical movement of the base molds 15 in unison.

The base mold platform 16 is mounted for movement relative to the plate 17, being maintained in proper alignment therewith by four sleeves 26, each of which is fixed to the plate 17 and is disposed about one of the rods 18. With this arrangement the platform 16 may be moved relative to the plate 17, but their associated base molds 15 and body molds 14 respectively, will remain in proper alignment with respect to each other. As best seen in Figure 3 the plate 17 is fixed to a U-shaped piston rod 27 by a pair of brackets 28.

Vertical movement of the base molds 15 relative to the body molds 14 is achieved by fluid pressure directed into a cylinder 33 to move its cooperating piston 34, shown in Figure 3. The piston 34 is secured to the piston rod 21 for moving the base molds 15. Movement of the entire assembly, including both the base molds 15 and body molds 14 as a unitary structure is effected by fluid pressure directed into a cylinder 35 to move its cooperating piston 36 which is secured to the U-shaped connecting rod 27. Since it is necessary to effect movement of the entire assembly with the piston 36, the cylinder 33 for actuating the base molds 15 is secured to the U-shaped piston rod 27 by any suitable means such as screws 37 so that it will move with it.

Fluid pressure for actuating the pistons 34 and 36 is obtained from a pump 40 as shown in Figure 1, which pumps fluid from a sump (not shown) through an intake pipe 41, and discharges the fluid into a pipe 42 for transmission to a pair of manually operated valves 43 and 44. The valve 43 serves to control the flow of fluid to the cylinder 33 for moving the piston 34 in either direction. The fluid may be directed to the upper portion of the cylinder 33 for the purpose of moving the piston 34 downwardly by pivoting a handle 45 in one direction to direct the fluid from the pipe 42 into a flexible tubing 46 which has communication with the upper portion of the cylinder 33. At the same time the valve 43 connects a flexible tube 47 to the sump through a pipe 48, the tube 47 having communication with the bottom of the cylinder 33 so that the exhaust fluid from the bottom of the cylinder 33 may flow into the tube 47, for transmission to the valve 43 and thence into the pipe 48 which carries it to the sump.

In like manner, the flow of fluid into the cylinder 33 may be reversed by manipulating the handle 45 in the opposite direction. In this position, the valve 43 directs the flow of fluid from the pressure pipe 42 into the flexible tube 47 to the bottom of the cylinder 33 for actuating the piston 34 upwardly. At the same time the valve 43 connects the flexible tube 46 to the return line 48 to carry the exhaust fluid from the top of the cylinder 33 into the sump.

Fluid pressure for operating the piston 36 in the cylinder 35 is controlled by the valve 44, the direction of flow being changed by manipulating a handle 52. Pivoting the handle 52 in one direction serves to direct the fluid pressure into a flexible tube 53 which carries the pressure to the top of the cylinder 35 for urging the piston 36 downwardly. The exhaust fluid then flows from the bottom of the cylinder 35 into a flexible tube 54 to the valve 44 which connects the tube 54 with a return pipe 55 connected to the sump.

Pivoting the handle 52 in the opposite direction serves to reverse the direction of flow just described so that the pressure is directed from the pipe 42 into the flexible tube 54 for transmission to the bottom of the cylinder 35 to move the piston 36 upwardly. The tube 53 then becomes an exhaust line, being connected to the return line 55 by the valve 44 so that the exhaust fluid from the top of the cylinder 35 is carried by the tube 53 to

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the valve 44 and thence to the return line 55 to return to the sump.

The flow of pressure from the pipe 42 is directed to the cylinders 33 and 35 by the valves 43 and 44 by pivoting their respective handles 45 and 52 in either direction from the position shown in Figure 1. The drawing shows the handles 45 and 52 in their neutral position where the pressure flow from the pipe 42 is blocked and no fluid is reaching the cylinders 33 and 35. It is to be understood that the hydraulic circuit is also provided with pressure relief valves (not shown) for relieving excessive pressure built up in the lines by the pump 40, such valves serving to by-pass the cylinders and direct the fluid from the pump 40 back to the sump. With the valves 43 and 44 in the closed position as shown in Figure 1, the entire output of the pump 40 is returned to the sump by these relief valves.

It will be noted from the drawings that the molds are fabricated of a fine mesh screen or wire cloth in the area where it is desired to apply the paper pulp, and the openings of the vase, where no paper pulp is to be applied, are represented by solid sheet metal, the entire interior of the mold being hollow. The paper pulp is applied to the mold by suction while the mold is immersed in the pulp, the suction serving to draw the pulp against the wire cloth portion of the mold. When sufficient pulp has been applied to the molds to form a vase they are withdrawn from the pulp, and the interior of the molds are then connected to a source of air pressure, which functions to release the completed vases from the molds.

A partial vacuum is produced in the interior of the molds for drawing the paper pulp upon their wire cloth portions by a vacuum pump 60 which is connected to a control valve 61 by a pipe 62 and to another control valve 63 by a branch line 64. The control valve 61 functions to connect the vacuum pump 60 with the base molds 15 while the control valve 63 operates to connect the vacuum pump with the body molds 14. The valve 61 has communication with the base molds 15 through a flexible tube 65, which connects with a pipe 66 having branch lines 67 in communication with the interiors of the molds. The valve 63 in turn, connects with the body molds 14 through a flexible tube 70 which connects with a pipe 71 having branch lines 72 in communication with the interiors of the body molds.

The air pressure for releasing the completed vases from the molds is obtained from an air pump 75. The air pump 75 is connected to the valves 61 and 63, which also control the vacuum, by a pipe 76 and a branch line 77. Thus, the valves 61 and 63 serve to connect either the vacuum pump 60 or the air pump 75 to the interiors of the molds. The valves are provided with operating handles 78 and 79 which may be manipulated in either direction from the neutral position shown in Figure 1. By pivoting the handles 78 and 79 in one direction the vacuum pump 60 may be connected to the interior of the molds, and by pivoting them in the opposite direction the air pump 75 may be connected to the interior of the molds, in both cases, the valves 61 and 63 directing either the vacuum or the pressure into the flexible tubes 65 and 70 respectively. The operating handles 78 and 79 of the valves 61 and 63 are shown in Figure 1 in their neutral position where all flow through the valves is blocked.

The process of forming the vases upon the molds may be clearly followed from the drawings in which the several views show the successive positions of the molds as the paper pulp is applied to them to complete the vase. In Figure 1, the molds are shown in their starting position, withdrawn from the paper pulp 12 and the base molds 15 separated from the body molds 14. With the molds in this position, the handle 52 of the valve 44 is manipulated to direct the flow of fluid pressure from the pump 40 to the upper portion of the cylinder 35 to force its cooperating piston 36 downwardly. The piston 36

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moves the entire mold assembly with it, so that the body molds 14, and the base molds 15, move downwardly as a unit, without changing their positions relative to each other, into the vat 11 to become immersed in the paper pulp 12 as shown in Figure 2.

With the molds immersed in the pulp, and the body molds 14 separated from the base molds 15 as depicted in Figure 2, the handles 78 and 79 of the valves 61 and 63 respectively, are manipulated to connect the vacuum pump 60 with both the body molds 14 and the base molds 15 to apply a suction to the interiors of the molds. The suction thus applied serves to draw the paper pulp onto the wire cloth portion of the molds. It has been found advisable to release the vacuum to the interior of the molds and reapply it several times while the molds are in this position to more closely compact the pulp upon the molds and also to provide a heavier layer of pulp, the handles 78 and 79 being returned to their neutral position when the operation is completed.

It will be noted that when the pulp is being applied with the body molds 14 separated from the base molds 15, a layer of pulp is being formed on the top of the base mold 15, and the bottom of the body mold 14. These two layers are to be subsequently united to combine integrally and form the bottom panel of the vase. To accomplish this, the base molds 15 are moved upwardly into contact with the bottoms of the body molds 14 as illustrated in Figure 3, by manipulating the handle 45 of the valve 43 to admit fluid pressure into the bottom of the cylinder 33.

The fluid pressure in the bottom of the cylinder 33 forces its associated piston 34 upwardly which causes the base molds 15 to move upwardly relative to the body molds 14 by reason of the construction previously described, into contact with the bottoms of the body molds 14. As the base molds 15 thus unite with the body molds 14, the combination takes the form of the completed vase. It has been found however, that the mere uniting of the base molds 15 with the body molds 14 after they have received a layer of paper pulp is not sufficient to form an integral structure of papier-mâché. It is necessary to apply additional paper pulp to the molds while they are in the combined position as shown in Figure 3, to complete the vase and create a smooth appearance with sturdy construction.

Therefore, after the molds have been combined, the handles 78 and 79 of the valves 61 and 63 respectively, are manipulated to again connect the vacuum pump 60 with the interiors of the body molds 14 and the base molds 15 to apply suction to their interiors and draw an additional layer of pulp upon their wire cloth surfaces. At this point it is again preferable to release the vacuum and reapply it several times as in the case when the body molds 14 were separated from the base molds 15. After this operation is completed, a finished vase 80, as depicted in Figure 6, is formed on the combined molds, the handles 78 and 79 being returned to their neutral position.

The entire mold assembly is then removed from the paper pulp as a unit, by manipulating the handle 52 of the valve 44 to admit pressure to the bottom of the cylinder 35 and force its piston 36 upwardly. The piston 36 moves the entire mold assembly out of the pulp with the body molds 14 and the base molds 15 remaining united as shown in Figure 4. At this point, the paper pulp adhering to the molds is a wet mass having a high liquid content, and the excess moisture is removed therefrom by again manipulating the handles 78 and 79 to connect the interiors of the body molds 14 and the base molds 15 to the vacuum pump 60. In addition to removing the excess moisture from the pulp, the suction thus applied while the molds are withdrawn from the vat 11, serves to more closely compact the paper pulp upon the molds.

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The next operation in the process is to remove the base molds 15 from the vases. This is accomplished by first connecting the air pump 75 to the interiors of the base molds 15 to form an air pressure within the base molds which functions to force the paper pulp off of the mold. The slightest separation of the paper pulp from the molds provides an escape for the air so that the vases are not deformed in any way by the application of the air pressure to them. The handle 45 of the valve 43 is then manipulated to direct fluid pressure from the pump 40 to the top of the cylinder 33. The pressure in the top of the cylinder 33 urges the piston 34 downwardly which moves the platform 16 and its associated base molds 15 with it, so that the base molds are moved away from the body molds 14, the paper pulp vases adhering to the body molds as shown in Figure 5.

After the base molds have been separated from the body molds as shown in Figure 5, a tray or other similar receptacle (not shown) may be placed over the base molds 15, under the body molds 14 to receive the completed vases 80. Upon placing the tray in position to receive the vases, the handle 79 of the valve 63 is moved to admit air pressure from the pump 75 to the interiors of the body molds 14. The application of air pressure to the interiors of the body molds 14 serve to clearly separate the completed vases 80 from the body molds 14, the vases dropping upon the tray which has been placed underneath them.

Although not completely dry, the paper pulp has been sufficiently compacted upon the molds, and the excess moisture has been removed by vacuum as previously described, so that the vases have sufficient body to hold their shapes after they have been removed from the molds. The completed vases 80 then appear as shown in Figure 6. They are placed in an oven where they are thoroughly dried to form a papier-mâché vase of rigid and sturdy construction, the completed vase being very durable and able to withstand a great deal of abuse.

From the foregoing detailed description of an exemplary process representative of the process comprising the present invention, and an illustrative apparatus for carrying out the process, it is apparent that a new and improved method has been provided for molding papier-mâché articles having a narrow central portion, in which the entire article is formed integrally from two molds, eliminating the necessity of utilizing a sand core to form a portion of the article.

Although the illustrative embodiment of the invention has been described in considerable detail for the purpose of making a full disclosure of a practical operative arrangement by means of which the invention may be practiced, it is to be understood that various novel features of the invention may be incorporated in other arrangements without departing from the spirit and scope of the invention as defined in the subjoined claims.

The principles of the invention having now been fully explained in connection with the foregoing description of embodying structure, I hereby claim as my invention:

In an apparatus for forming a papier-mâché article of unitary structure from two separate molds, a vat for receiving the paper pulp of which the article is to be formed, a piston and cylinder mechanism having a connecting rod extending therefrom, a first support fixed to said connecting rod for movement therewith above said vat, a mold shaped to form one portion of the article mounted on said first support so that it may be moved with the support into and out of said vat, a second piston and cylinder mechanism mounted on said connecting rod for movement therewith, a bracket connected to be moved by said second piston and cylinder mechanism relative to said first support, a plurality of rods secured to said bracket, a second support attached to said rods for movement with said bracket, a second mold shaped to form the other portion of the article and carried by said sec-

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ond support in alignment with the first mold so that it may be moved by said second piston and cylinder mechanism into combined relationship with the first mold for forming the completed article, and a sleeve placed about each of said rods and secured to said first support for guiding the movement of said rods and thereby the movement of said second support relative to said first support for retaining the two molds in proper alignment, whereby the first piston and cylinder mechanism serves to move both of said supports and their associated molds unitarily into and out of the vat by reason of the mounting of the second piston and cylinder mechanism on its connecting rod, and the second piston and cylinder mechanism serves to move the second support relative to the first support for moving the molds into combined relationship or for separating them.

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References Cited in the file of this patent

UNITED STATES PATENTS

499,427	Hubbard	June 13, 1893
549,998	Fairbanks et al.	Nov. 19, 1895
1,690,528	Bushnell	Nov. 6, 1928
1,873,585	Harvey	Aug. 23, 1932
1,875,075	Mason	Aug. 30, 1932
1,907,795	Hall	May 9, 1933
2,307,022	Chaplin	Jan. 5, 1943

FOREIGN PATENTS

304,442	Germany	May 22, 1918
133,952	Great Britain	Apr. 13, 1921
462,359	Great Britain	Mar. 4, 1937