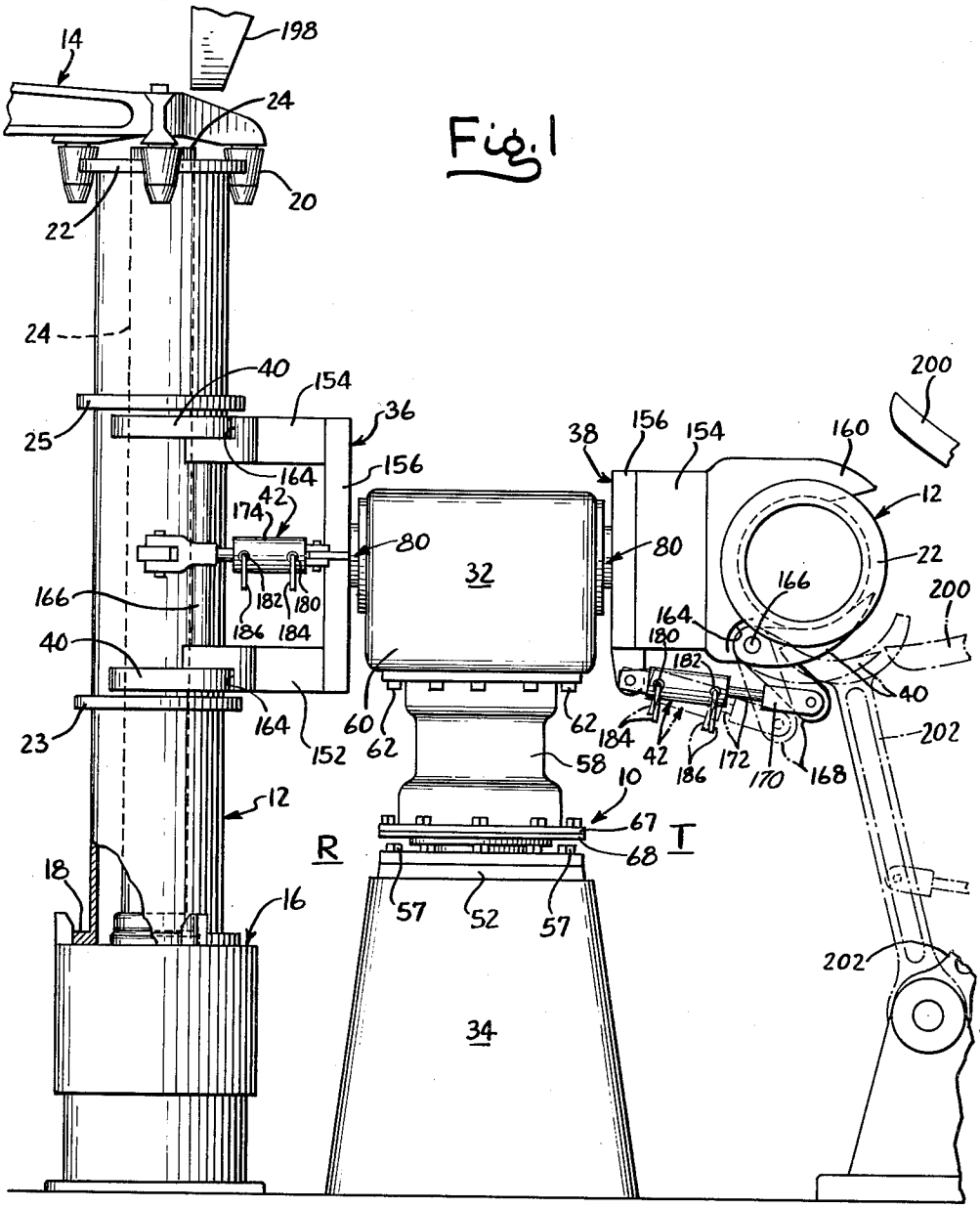
Nov. 6, 1962 W. A. HUNTER 3,062,388

ROTARY FLASK AND MOLD TRANSFER AND UPENDING MECHANISM

Filed March 16, 1960 3 Sheets-Sheet 1

Fig. 1




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ROTARY FLASK AND MOLD TRANSFER AND UPENDING MECHANISM

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Fig. 2

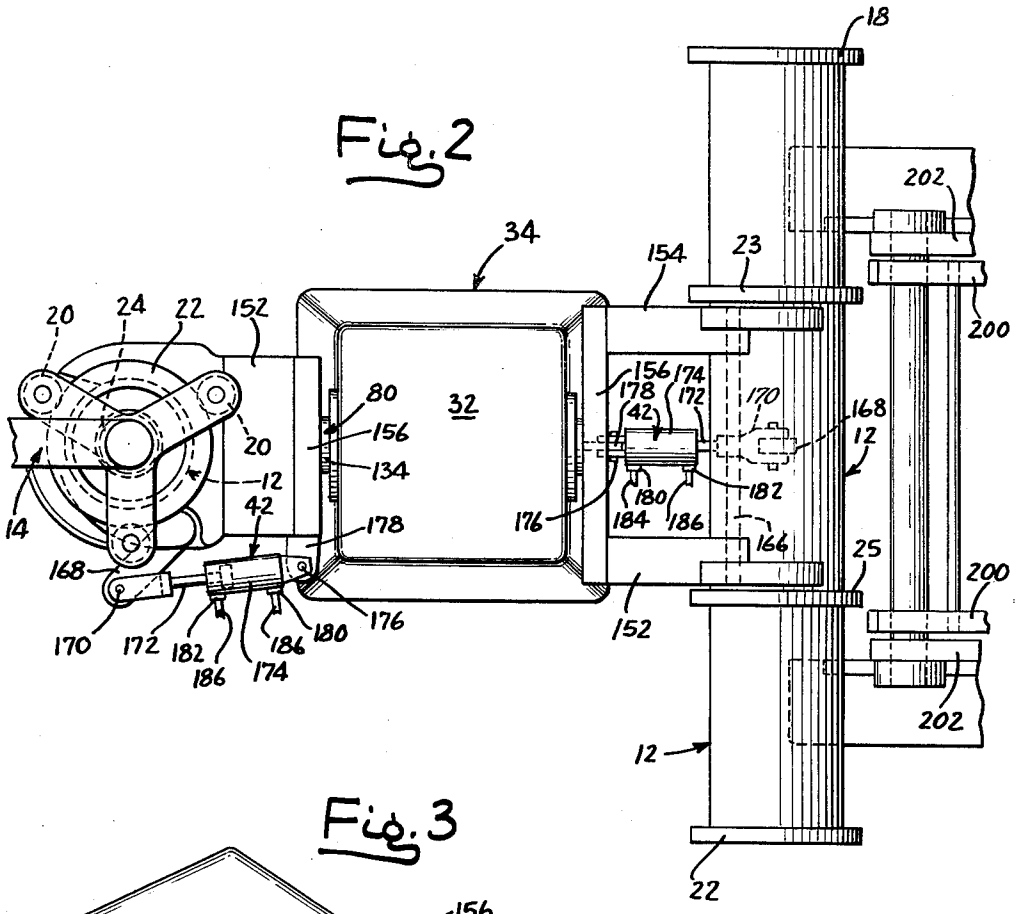
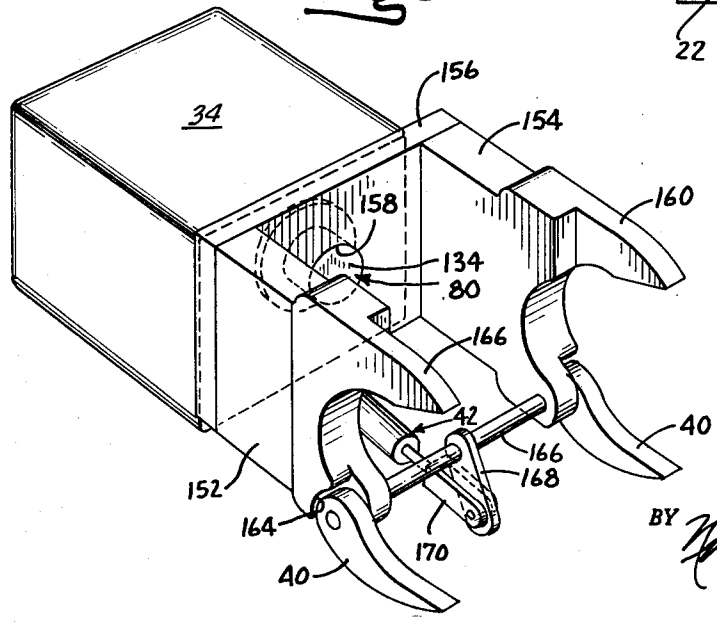



Fig. 3




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ROTARY FLASK AND MOLD TRANSFER AND UPENDING MECHANISM

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Fig. 4

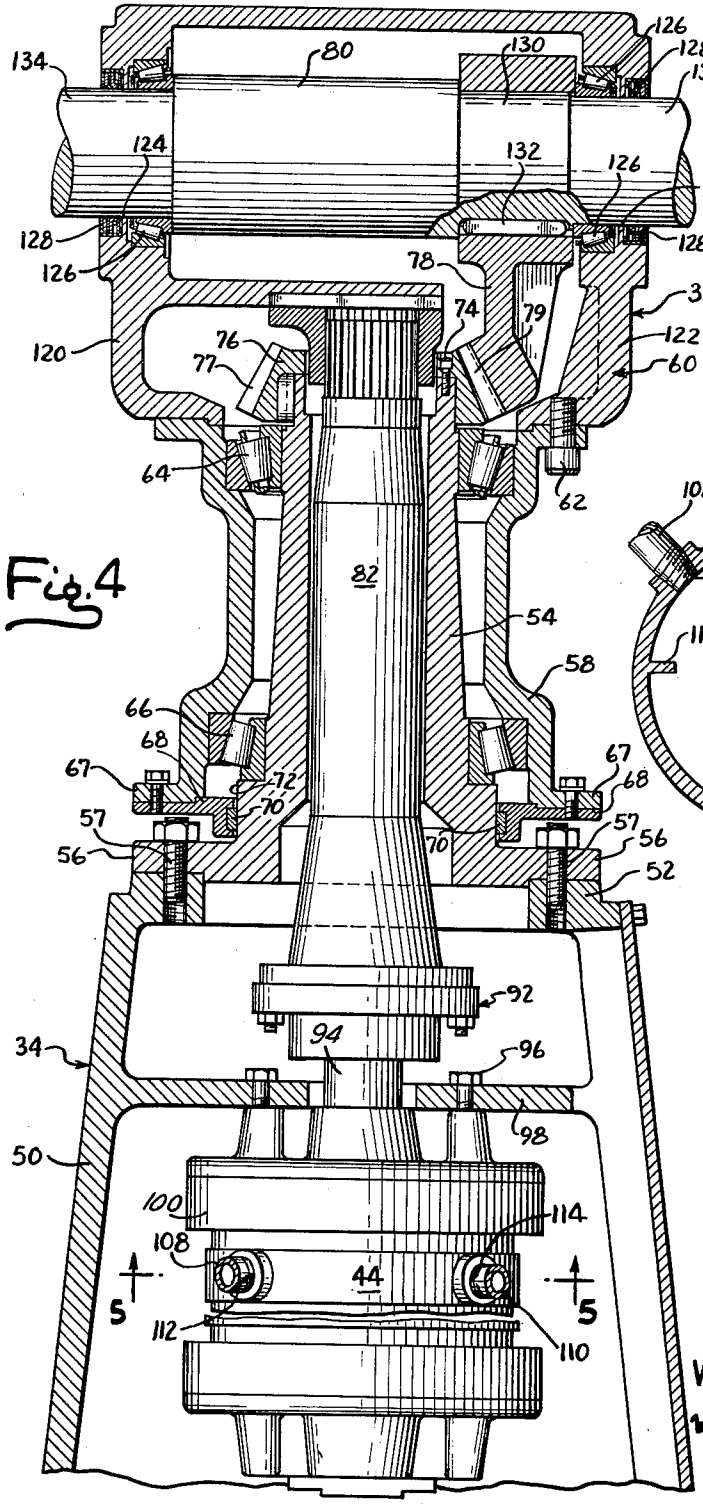
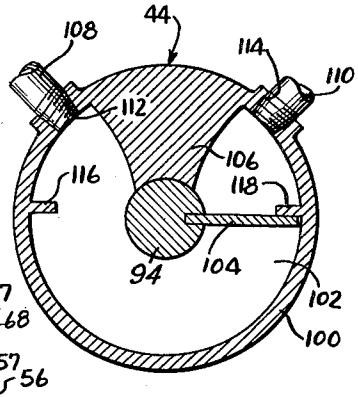



Fig. 5




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# ROTARY FLASK AND MOLD TRANSFER AND UPENDING MECHANISM

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2 Claims. (Cl. 214—1)

The improved transfer and upending mechanism comprising the present invention has been designed for use primarily in connection with the handling of flasks and molds which are to be employed in the centrifugal casting of metal articles such as pipe sections or the like. More specifically, in the handling of flasks and molds, the transfer and upending mechanism of the present invention is adapted to be operatively positioned between a transfer station and a ramming station to successively receive empty cylindrical flasks which are delivered to the transfer station from a remote point, and to transfer the empty flasks to the ramming station while at the same time upending them so that they may be delivered at the ramming station in an upright position and in vertical register with a lower pattern base and an upper core pattern maintained at said ramming station preparatory to movement of these pattern elements into operative association with the empty flasks and subsequent flask spinning operations. Simultaneously with the transportation of the empty flasks from the transfer station to the ramming station in the manner briefly outlined above, the transfer and upending mechanism of the present invention is adapted to successively transfer the flasks with the molds therein back to the transfer station while at the same time causing the same to become declined so that they may be delivered to the transfer station in a horizontal position for subsequent removal therefrom. The invention is, however, not limited to such foundry applications. It is capable of other uses and a transfer and upending mechanism constructed in accordance with the principles of the present invention may, with or without suitable modification as required, be employed for receiving articles other than molds and flasks at one location in any position of orientation, and for transporting them to another location while at the same time altering their relative position in space so that they may be delivered at the second location in a different position of orientation. Irrespective, however, of the particular use to which the present invention may be put, the essential features thereof are at all times preserved.

In the production of sand molds of the character briefly outlined above, it is desirable that as many handling operations as possible be performed mechanically inasmuch as most of these operations involve the skillful handling of heavy objects and articles and require considerable physical strength if an operator is to make consistently acceptable molds. Since molds of this character must conform closely to specifications with small allowable tolerances, the production of relatively heavy molds invariably entails a large number of rejects due to operator fatigue, particularly at the end of any given working shift. The mold transfer and upending mechanism of the present invention is designed to eliminate to a large extent the manual operations which are ordinarily required in transporting empty mold flasks to a ramming station, in setting up the flasks for the ramming and spinning operations, and in transporting the flasks with the molds therein, after spinning operations are complete, from the ramming station.

The provision of a transfer and upending mechanism of the character briefly outlined above being among the principal objects of the invention, it is a further and



and more specific object to provide such an apparatus which is cyclic in its operation and in which dual flask and mold handling operations are effected simultaneously during each machine cycle, which is to say, that the mechanism is so designed that as the empty flasks are being transported to the ramming station and undergoing upending, the flasks with the completed molds therein are being removed from the ramming station and undergoing declination.

In carrying out this last mentioned object, the invention contemplates the provision of a rotary dual-head turret which is adapted to be positioned between the transfer and ramming station and which has associated therewith two flask-handling heads in the form of releasable jaw-clamping assemblies. The turret is capable of rotation about a vertical axis while the jaw assemblies, which are disposed at diametrically opposed regions of the turret, are capable of rotation in unison about a common horizontal axis which swings with the turret. The turret is adapted to be indexed alternately in opposite directions through an angle of 180° to swing one of the jaw assemblies from the transfer station to the ramming station while at the same time swinging the other jaw assembly from the ramming station back to the transfer station. Each jaw assembly has associated therewith a fluid-actuated control device by means of which jaw-opening and jaw-closing operations may be effected at the transfer and ramming stations, respectively. The jaw assemblies are tractionally geared to a stationary portion of the turret mounting so that each assembly will assume a position wherein the axis of its jaws extends horizontally when such assembly is disposed at the transfer station. As the turret is indexed so as to move the jaw assembly from the transfer station to the ramming station, the jaw assembly is turned through an angle of 90° under the influence of the traction gearing so that as it arrives at the ramming station it will assume a position wherein the axis of the jaws will extend vertically. Conversely, each indexing operation of the turret will serve to swing one of the jaw assemblies from the transfer station to the ramming station and, in so moving between the two stations, the jaw axis of the assembly will become declined so that when the assembly is returned to the transfer station, the axis will be horizontal. By such an arrangement, it is possible to conveniently feed empty flasks to the jaw assemblies at the transfer station by positioning a flask-transporting conveyor at the transfer station so that a jaw assembly moves into register with the discharge end of the conveyor at the end of each indexing operation. Similarly, at the ramming station, the arrival of the empty flasks in a vertical position makes it possible conveniently to position the flask-spinning mechanism at the ramming station so that the empty flasks move into vertical register with the spinning table, as well as with the upper and lower pattern devices. The fluid-actuated control devices for the jaws may thus be actuated at the transfer station to cause the empty flasks to be firmly gripped for subsequent transfer and upending operations, while at the ramming station, these control devices may be actuated to release the flask for spinning operations, and immediately thereafter, to again grip the filled flask with the mold therein for transportation back to the transfer station accompanied by declination of the flask. Finally, at the transfer station, the jaws may be caused to release the flasks for discharge in a horizontal position with remaining open to receive the next successive empty flask therein. The operation of the apparatus is continuously repetitious.

The provision of a transfer and upending mechanism of this character which is relatively simple in its construction and design; one of which is comprised of a mini-

mum number of moving parts and which, therefore, is unlikely to get out of order; one which is rugged and durable and which, therefore, will withstand rough usage; one in which the turret proper receives rotational support at widely spaced regions on its supporting pedestal so that the turret is stable in its movements; one in which the internal moving parts thereof are adequately shielded from contamination with dust, dirt and other foreign materials; one which is compact in its design; and one which, otherwise, is well adapted to perform the services required of it are further desirable features which have been borne in mind in the production and development of the present invention.

In the accompanying three sheets of drawings forming a part of this specification, one illustrative embodiment of the invention has been shown.

In these drawings:

FIG. 1 is a side elevational view, somewhat schematic in its representation, showing a transfer and upending mechanism constructed in accordance with the principles of the present invention operatively positioned in a foundry installation between a flask transfer station and a flask ramming station;

FIG. 2 is a top plan view of the structure shown in FIG. 1;

FIG. 3 is a perspective view of a jaw assembly employed in connection with the present invention;

FIG. 4 is an enlarged sectional view taken substantially centrally and vertically through the transfer and upending mechanism of FIG. 1; and

FIG. 5 is a sectional view taken substantially along the line 5—5 of FIG. 4.

Referring now to the drawings in detail, and in particular to FIGS. 1 and 2, the transfer and upending mechanism which forms the subject matter of the present application has been designated in its entirety at 10 and it is shown as being operatively disposed in a foundry installation in the vicinity of a transfer station T to which a series of empty shell flasks 12 are delivered and from which they are transferred by the mechanism 10 for deposition in an operative position for ramming at a ramming station R.

The installation selected for illustration herein is substantially the same as that shown in my copending application Serial No. 15,285, filed on March 16, 1960, and entitled "Method of and Apparatus for Producing Sand Molds," portions of the installation being omitted herein since they have only an indirect bearing upon the functioning of the mechanism 10. For a full disclosure of the installation, including a detailed description of certain flask-handling mechanisms at the transfer station and by means of which empty flasks are fed to the mechanism 10, certain other flask-handling mechanisms at the transfer station and by means of which rammed flasks with the molds therein are received upon discharge from the mechanism and conducted to a remote location, and certain ramming instrumentalities employed at the ramming station R in cooperation with the mechanism 10, reference may be had to such application. In the present application, and particularly in FIGS. 1 and 2, only such apparatus as is disposed in the immediate vicinity of the transfer and upending mechanism 10 and as has a direct association with this mechanism has been illustrated.

Briefly, there is disposed at the ramming station R a vertically shiftable lift carriage 14, only a portion of which has been shown. A spinning table 16 is adapted to operatively receive thereon the lower flanged end 18 of a tubular shell flask 12 and in the lowered position of the carriage 12, a series of centering rollers 20 which are mounted on the carriage 14 straddle and engage the upper flanged end 22 of the flask, and serve to center the same above the spinning table 16. The flask 12 is further provided with a pair of spaced medial flanges 23 and 25 which serve as flask-centering devices for preventing axial shifting of the flasks during certain flask-handling operations at the transfer station T, as will be described presently.

The carriage 14 also has associated therewith an upper pattern centering and pattern draw assembly by means of which the upper end of a tubular mandrel 24 is supported and centered so that it may be lowered into the flask preparatory to spinning operations, centered therein during such spinning operations, and elevated or drawn from the flask after spinning operations have been completed. The spinning table 16 is mounted for rotation about a vertical axis and it also is shiftable vertically so that a lower hub pattern 26 may be moved into position in the lower regions of the flask and withdrawn therefrom after spinning operations have been completed. As set forth in detail in my copending application above referred to, the transfer and upending mechanism 10 of the present invention is adapted to successively deliver flasks in a vertical position to the ramming station from the transfer station and align the flasks with the vertical axis of the spinning table and of the upper and lower patterns so that, by a relative movement of the patterns toward each other, the patterns may be introduced into the flask and the flask thus closed for spinning operations without necessitating any further handling of the flasks at the ramming station other than the release of the flask at the commencement of spinning operations to free the flasks for rotational movement and the engagement of the flasks after spinning operations for flask withdrawal purposes.

Still referring to FIGS. 1 and 2, briefly, the transfer and upending mechanism 10 includes an oscillatory turret assembly 32 which is turnably mounted for rotation in opposite directions about a vertical axis on a stationary turret base 34. Projecting horizontally outwardly in opposite directions from the turret assembly 32 are a pair of flask-handling jaw assemblies or cradles 36 and 38, respectively, each assembly having associated therewith a pair of releasable flask-clamping fingers 40. The fingers 40 are movable between a closed flask-clamping position and an open flask-releasing position under the control of a fluid-operated actuator which may assume the form of a piston and cylinder assembly 42. The turret assembly 32 is adapted to be periodically indexed throughout an angle of 180° under the control of a fluid-actuated motor 44 which is enclosed within the turret base structure 34. The two jaws assemblies 36 and 38 are rotatable about a common horizontal axis and they are capable of being indexed in unison throughout an angle of 90° so that an empty flask 12 received in one of the jaw assemblies in a horizontal position at the transfer station T may be upended and delivered to the ramming station R in a vertical position, while at the same time, a flask 12 containing a core mold which has been spin-formed at the ramming station R may be received by the other jaw assembly in a vertical position, and by a declining operation, delivered to the transfer station in a horizontal position. The upending and declining operations referred to above take place during indexing of the turret 32, jaw indexing operations being an automatic function of the turret indexing operations.

Referring now additionally to FIG. 4 wherein the structure of the transfer and upending mechanism 10 is illustrated in detail, the previously mentioned turret base 34 embodies a base support in the form of a casting or frame 50 which may be generally of frusto-conical configuration and the upper rim of which is provided with an inturned supporting and bolting flange 52. A hollow tubular pedestal 54 of upwardly tapering design is provided with a flanged base portion 56 which is bolted as at 57 to the bolting flange 52. The previously mentioned turret assembly 32 is comprised of two principal parts, namely, a lower sleeve section 58 and an upper turret housing section 60, the two sections being bolted together as at 62. The sleeve section 58 encompasses the pedestal 54 and is rotatably supported thereon by

means of widely spaced upper and lower bearing assemblies 64 and 66, respectively. The lower flanged rim portion 67 of the tubular sleeve section 58 carries a dust cap ring or retainer 68 by means of which a felt or other sealing ring 70 is caused to bear against a cylindrical surface 72 of the pedestal 54.

The upper end of the pedestal 54 has secured thereto by means of anchoring screws 74 a stationary bevel gear 76 having teeth 77 thereon. The axis of the gear 76 extends vertically and the circumferential or arcuate extent of the gear is slightly in excess of 180°. The purpose of the bevel gear 76 is to provide a fixed reaction member for the tractional drive of a second and intermeshing bevel gear 78 having teeth 79 thereon and the axis of which extends horizontally. This latter gear serves to impart rotational movements in opposite directions to a jaw-supporting shaft 80 on which the previously mentioned jaw assemblies 36 and 38 are operatively mounted, this rotational movement being derived by a tractional rolling operation of the gear 78 upon the stationary gear 76.

The turret assembly 10 is adapted to be alternately indexed in opposite directions throughout an angle of 180°, each such rotation constituting a machine cycle during which an empty flask 12 is brought from the transfer station T to the ramming station R, while simultaneously a rammed flask 12 is moved to the ramming station to the transfer station. Accordingly, a drive shaft 82 projects upwardly through the fixed pedestal 54 and the upper end of the shaft carries a coupling member 84 which is splined as at 86 to the shaft and keyed as at 88 to an inwardly extending web 90 formed on the upper turret section 60.

A coupling member 92 operatively connects the lower end of the vertical drive shaft 82 to the vertical output shaft 94 of the previously mentioned fluid-actuated motor 44. The motor 44 is suspended by means of suitable bolts 96 from an internal web frame 98.

The fluid-actuated motor 44 is more or less of conventional design and no claim is made herein to any novelty associated with the same. It is deemed sufficient for descriptive purposes herein to rely upon the schematic disclosure of FIG. 5 wherein the principal or essential components of the motor 44 are illustrated schematically.

The motor 44 includes a casing 100 (FIG. 5) of generally cylindrical configuration and providing an internal operating chamber 102 for a pivoted swinging vane 104. The output shaft 94 extends vertically through the chamber 102 and the vane 104 is carried by and extends radially outwardly from the shaft within the casing 100 so as to make substantial sweeping contact with the inside cylindrical face of the casing 100. A relatively short web 106 is formed internally on the casing 100 and extends radially inwardly and makes substantial sealing contact with the shaft 94. The pivoted vane 104 is designed to be swung within the casing 100 through an angle of 180° in opposite directions under the motivating influence of fluid under pressure admitted to the interior or the casing 100 through fluid lines 108 and 110 which communicates with the chamber 102 through respective fluid ports 112 and 114. Angular swinging movement of the vane 104 is limited in opposite directions by means of internal lugs or stops 116 and 118 formed on the casing wall internally thereof.

The fluid lines 108 and 110 may be operatively connected to a suitable control valve (not shown) which, in turn, may be connected to a source of motive fluid under pressure. Thus, the ports 112 and 114 alternately may serve as fluid inlet and fluid outlet ports for alternate movement of the vane 104 and, consequently, of the output shaft 82 and turret assembly 10 in opposite directions.

The upper turret housing section 60 includes spaced end walls 120 and 122, through which walls there extend aligned openings 124. The jaw-supporting shaft 80 extends horizontally through the housing section 60 and is rotatably journalled in the aligned openings 124 by means of respective bearing assemblies 126. Near the outside rims of the openings 124, suitable dust seal assemblies 128 are provided between the shaft 80 and the end walls 120 and 122. The shaft 80 is formed with a reduced secton 130 and the bevel gear 78 is mounted on and keyed as at 132 to this reduced shaft section. The shaft 80 is further reduced as at 134 at the opposite ends thereof and these reduced end portions have operatively mounted thereon the respective previously mentioned jaw assemblies 36 and 38.

The two jaw assemblies 36 and 38 are substantially identical in construction and, therefore, it is believed that a description of one of them will suffice for the other. Each jaw assembly is in the form of a jaw cradle of generally U-shape configuration in longitudinal cross section, as best seen in FIG. 3. Each assembly includes a pair of parallel side plates 152 and 154, respectivley, and a connecting web plate 156. The web plate 156 is formed with a central circular opening 158 into which the distal end of the adjacent reduced portion 134 of the shaft 80 extends and in which opening it is secured by welding. Each side plate 152 and 154 is formed with a forwardly extending fixed jaw finger 160 which projects forwardly from one longitudinal edge of the side plate, the two jaw fingers extending in parallelism and constituting in effect a composite fixed jaw which is opposed by the previously mentioned pivoted flask-clamping jaw fingers 40. These latter jaw fingers 40 have their base or proximate ends seated within recesses 164 provided in the respective side plates 152 and 154 and are rigidly connected together by a transverse operating shaft 166. The ends of the operating shaft 166 are rotatably mounted in the two side plates 152 and 154, respectively. The connecting and operating shaft 166 has fixedly secured thereto in the medial regions thereof a torque arm 168, the distal end of which is adjustably and pivotally connected by a yoke 170 which is threadedly received on one end of a piston rod 172 associated with the previously mentioned piston and cylinder assembly 42. The other end of the rod extends into a cylinder 174, an end of which is pivoted as at 176 to a bracket 178 mounted on the web plate 156.

The cylinder 174 is provided with fluid ports 180 and 182 which are connected to respective flexible fluid lines 184 and 186 which may be operatively connected to a suitable control valve (not shown) by means of which motive fluid may be selectively directed to the piston and cylinder assembly 42. The two ports are disposed on opposite sides of a piston 188 within the cylinder 174, the latter being operatively mounted on the piston rod 172.

The inner opposed surfaces of the various jaw fingers 40 and 160 are curved to conform to the cylindrical outer surfaces of the flasks 20 undergoing transfer between the ramming station R and the transfer station T, and vice versa. Thus, it will be seen that upon selective application of motive fluid to the opposite ends of the cylinder 174 through the ports 184 and 186, rocking motion will be imparted to the pivoted jaw fingers 40 for jaw-opening and closing movements in a manner and for a purpose that will be made clear presently.

In the operation of the transfer and upending mechanism 10, wads or slugs of sand are delivered to the cavity existing between the cylindrical wall of the flask 12 and the mandrel 24. These wads are delivered from a suitable sandslinger 198 to the flask after the flask and its patterns have been properly positioned and centered upon the super surface of the table 16 and while the latter is undergoing rotation. Assuming that the jaw assembly 36 is disposed at the ramming station R and that the jaw assembly 38 is disposed at the transfer station T during a given spinning operation, the pivoted jaw fingers 40 of the assembly 38 are maintained in their

open position until such time as the spinning operation has been completed. During this spinning operation, the rotating flask 12 is nested or cradled, so to speak, within the confines of the jaw assembly, but it is not engaged or otherwise restricted by this assembly and thus it is free to rotate without interference. Immediately after the spinning operation has been completed, motive fluid is supplied to the piston and cylinder assembly 42 to close the jaws and cause the vertically disposed flask 12 to be firmly gripped by the assembly 36.

During the spinning operation just described, the jaw assembly 38 at the transfer station T has its jaw axis extending horizontally so that when the pivoted jaw fingers 62 are in their open position, the jaws will be conditioned to receive therein an empty flask 12 which is positioned horizontally. Preferably, the flasks are automatically fed to the transfer and upending mechanism at the transfer station horizontally disposed jaw assemblies 36 or 38, as the case may be, at the transfer station T by means of a suitable conveyor, a fragment of which has been designated at 200 in FIG. 1. For a full disclosure of one automatic means suitable for feeding flasks 12 to the mechanism 10 in a horizontal position, reference may be had to my copending application Serial No. 15,285, referred to above. The two centering flanges 23 and 25 on the flask 12 straddle the conveyor sides and prevent endwise shifting of the flasks on the conveyor.

As soon as a flask 12 has been received in the jaw assembly 38, such reception of the flask coinciding with the completion of a spinning operation at the ramming station R, the fluid motor 44 is energized by admitting fluid to the port 118 through the fluid line 114 (FIG. 5) so as to rotate the turret assembly 32 on a clockwise direction as viewed in FIG. 2 throughout an angle of 180° and cause the jaw assembly 38 to move from the transfer station T to the ramming station R, while at the same time the jaw assembly 36 is moved from the ramming station to the transfer station. During such rotation of the turret assembly, the rotatable bevel gear 78 on the horizontal jaw-supporting shaft 80 will ride tractionally on the fixed intermeshing bevel gear 76 and describe an angular movement of 90° while the jaw assembly 38 describes an angular movement of 180°, thus causing a complete upending of the horizontal jaw assembly 38 by the time it arrives at the ramming station R. Upon arrival of the loaded jaw assembly 38 at its home position at the ramming station, the axis of the flask carried thereby will extend vertically and the flask will be maintained in an elevated position above the level of the spinning table 16 which, at this time, is in its lowered position. The centering carriage 12 wherein the lower end of the mandrel 24 will assume an elevated position above the level of the upper end of the flask with the mandrel poised, so to speak, for subsequent descent into the flask.

As set forth in my above-mentioned copending application Serial No. 15,285, the lift carriage 14 is lowered while the table 16 is elevated and the various pattern devices are operatively assembled upon the flask so that spinning operations may ensue. Upon completion of such spinning operations, the pattern draw operations are effected and the carriage 14 and table 16 are moved relatively away from each other to free the flask 12 with the newly formed mold therein for conduction by the transfer and upending mechanism 10 to the transfer station T.

At this time, and in order to effect such transfer of the flask 12 from the ramming station R to the transfer station T, fluid is supplied to the piston and cylinder assembly 42 to cause the movable jaw fingers 40 to close upon the flask body between the two flanges 23 and 25, after which the fluid motor 44 is operated to rotate the turret throughout an angle of 180°, thus causing the jaw assembly 38 with the flask 12 carried thereby to be conducted to the transfer station while at the same time, due to the previously described traction cooperation between the intermeshing fixed and movable bevel gears 76 and 78, respectively, the shaft 80, and consequently, the jaw assembly 38, will be turned about a horizontal axis through an angle of 90° to deliver the flask to a transfer carriage 202 at the transfer station R in a horizontal position.

From the previous description, it will be understood that during each indexing operation of the turret 32, whether the motion thereof be clockwise or counterclockwise as viewed in FIG. 2, an interchange of jaw assemblies between the transfer and ramming stations will take place. Movement of either jaw assembly from the transfer station T to the ramming station R is accompanied by an upending of the flask 12 carried by such jaw assembly. Conversely, movement of either jaw assembly from the ramming station to the transfer station is accompanied by a declination of the flask and mold carried thereby.

Upon return of the flask 12 to the transfer station T as described above, fluid is supplied to the piston and cylinder assembly 42 to open the jaw fingers 40 and release the flask. The released flask will roll by gravity over the distal edges of the jaw fingers 40 and it may be received in a suitable transfer carriage or other receptacle such as the receptacle 202 which is fragmentarily shown in FIG. 1 and which is brought into register with the jaw assembly at the transfer station as each jaw assembly arrives at this station.

It will be obvious that various modifications in the structural elements incorporated in our apparatus and their arrangement as well as in the procedural details are possible without departing from the spirit of the invention and the scope of the appended claims. For example, while the turret assembly 32 has been described herein as being oscillatable in that successive indexing operations thereof throughout an angle of 180° are accompanied by a reversal in the direction of turning movement of the turret, it is within the scope of the invention to effect unidirectional indexing movements, utilizing full, instead of partial, bevel gears in the turret housing, in which case rotary slip connections for the various flexible fluid lines involved will be resorted to. Only insofar as the invention has particularly been pointed out in the accompanying claims is the same to be limited.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. A transfer and upending mechanism for receiving an empty cylindrical mold flask in a horizontal position at one location and for delivering it in a vertical position at another location, while at the same time receiving a rammed flask with a mold therein at said latter location in a vertical position and returning it to the first location and delivering it thereat in a horizontal position, said mechanism comprising a base support, an elongated stationary tubular pedestal mounted on the upper end of said base support and having its axis extending vertically, a turret rotatably mounted in said pedestal for turning movements in either direction about a vertical axis, said turret including an upper turret body and a lower sleeve portion, said sleeve portion surrounding, being concentric with, and spaced outwardly from the pedestal, anti-friction bearing assemblies interposed between the pedestal and sleeve portion of the turret adjacent the top and bottom of the pedestal, a shaft extending horizontally and diametrically through said turret body above the pedestal and rotatable in the turret body, a flask-receiving jaw assembly mounted on each end of said shaft for rotation bodily with the shaft and for revolution about the vertical axis of the turret upon rotation of the latter, each jaw assembly including a fixed jaw, and a cooperating jaw movable toward and away from the fixed jaw between flask-clamping and flask-releasing positions respectively, an hydraulic piston and cylinder assembly operatively connected to each movable jaw for actuating the same, the axis of the

clamping jaws of the respective jaw assemblies lying in planes which are disposed at a right angle to each other with both axes extending normal to the axis of the shaft, intermeshing gear means on said turret and shaft constraining said shaft to rotate about its axis through an angle of 90° during rotation of the turret about its axis through an angle of 180° in either direction, a fluid motor fixedly mounted within said base support and having a vertically disposed output shaft, a drive shaft in alignment with said output shaft and projecting upwardly through the pedestal, means coupling the upper end of said drive shaft to the turret body in driving relationship, and means coupling the output and drive shafts in driving relationship.

2. A transfer and upending mechanism as set forth in claim 1 wherein said intermeshing gear means com-



prises a stationary bevel gear concentric with the vertical axis of the turret, and a second bevel gear fixedly mounted on the shaft and meshing with said stationary bevel gear, and including, additionally, a dust cap ring mounted on the lower end of said sleeve portion of the turret, and a sealing ring mounted on the dust cap ring and surrounding and bearing inwardly against the lower portion of said pedestal.

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