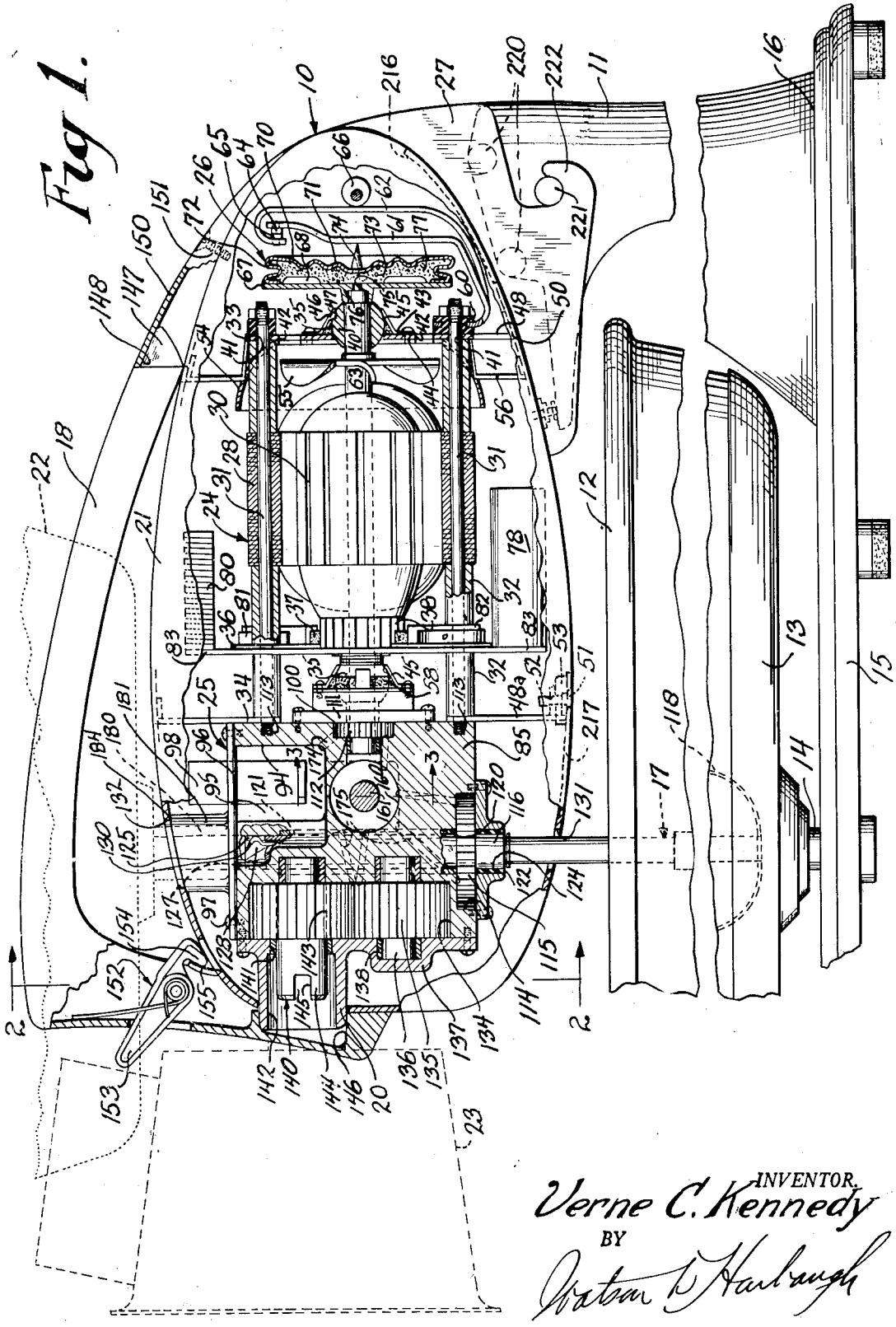
Aug. 14, 1945 V. C. KENNEDY 2,382,158

FOOD MIXER POWER UNIT

Filed Sept. 9, 1942 3 Sheets-Sheet 1

Fig 1.



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FOOD MIXER POWER UNIT

Filed Sept. 9, 1942 3 Sheets-Sheet 2

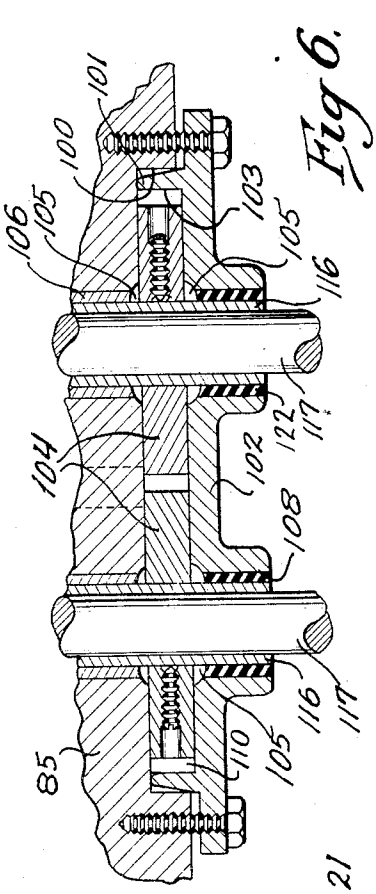


Fig 6.

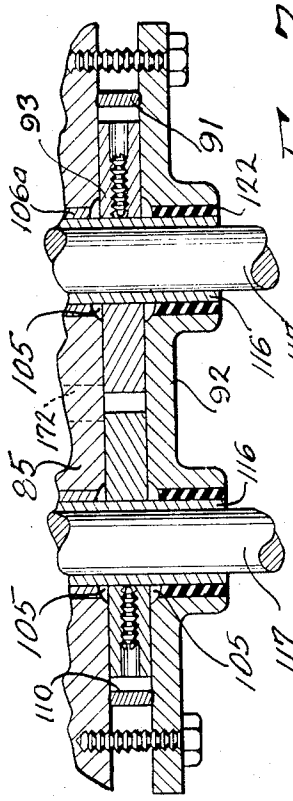


Fig 7.

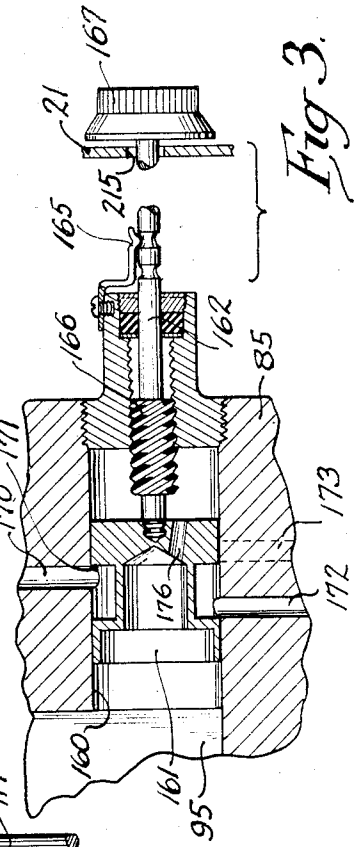


Fig 3.

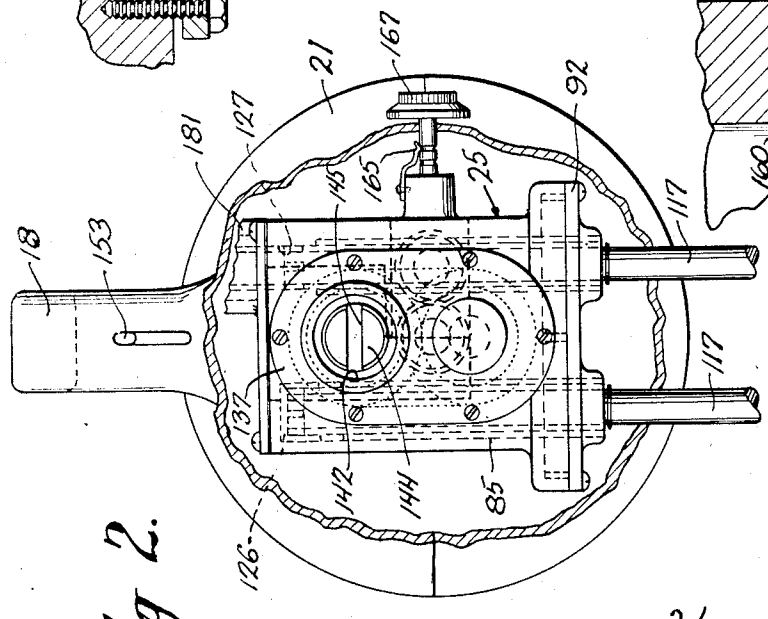


Fig 2.

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FOOD MIXER POWER UNIT

Filed Sept. 9, 1942 3 Sheets-Sheet 3

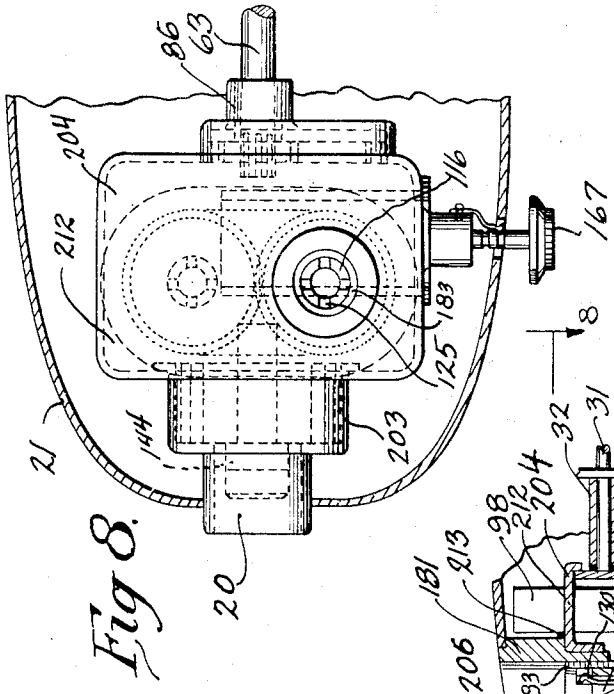


Fig 8.

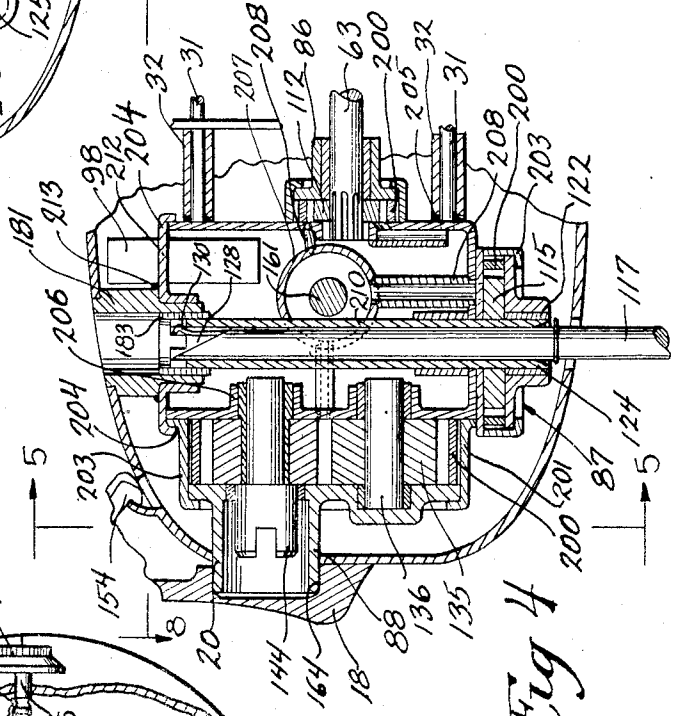


Fig 4

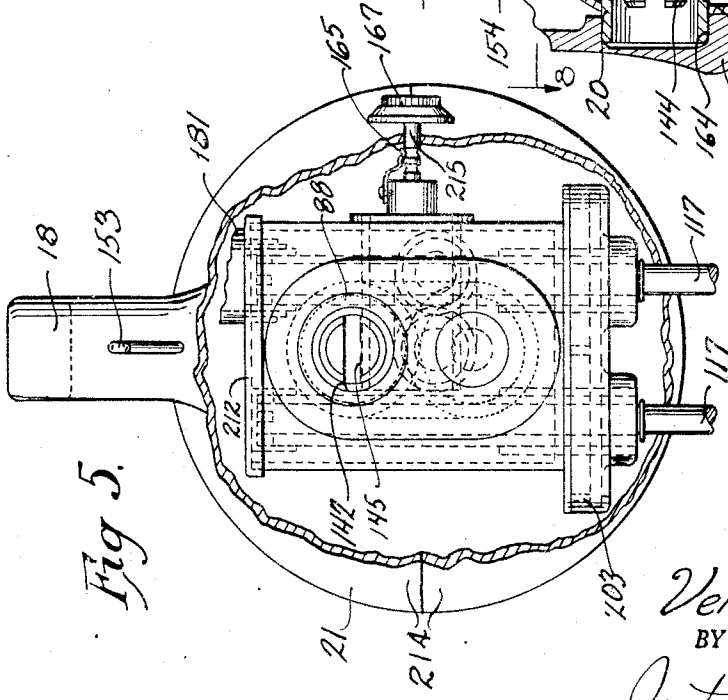


Fig 5.

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Patented Aug. 14, 1945 2,382,158

UNITED STATES PATENT OFFICE

2,382,158

FOOD MIXER POWER UNIT

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Application October 9, 1942, Serial No. 461,436

16 Claims. (Cl. 172—36)

This invention relates to food mixers and more particularly to a power device employed to mount and drive a plurality of food processing tools including a single beater or a plurality of interdigitating beaters for mixing food ingredients.

Certain features of the invention are related to and constitute improvements over the construction disclosed in my co-pending application, Serial No. 444,314, filed May 25, 1942, reference to which is hereby made.

Certain other features of the invention relate more particularly to an improved power transmission and speed governor for food mixers.

One of the objects of the invention is to provide an improved transmission by which a high speed fractional horse power motor is geared down to drive, selectively or otherwise, a plurality of food processing devices whose shaft speed reduction ratios vary from 10–1 to 300–1 revolutions per minute.

A further object of the invention is to minimize the number of gears employed to drive any one or all of three different types of processing tools.

Another object is to provide an improved construction for a transmission employing fluid under pressure as a power transmitting medium, and as a corollary thereto employing the power transmitting medium as a source of lubricant for the moving parts.

Another object of the invention is to provide a transmission having a plurality of shafts therein characterized as a unitary assembly which is capable of being dismantled only under the application of heat.

Another object of the invention is to provide an improved centrifugal speed governor wherein a self-contained body of fluid is employed as the centrifugated element.

A further object is to provide for an improved manner of mounting a handle upon the power unit in relationship to a power takeoff socket which is also relied upon to support a power device, and as a corollary to this object utilizing the power takeoff socket element as a means for securing in part a finishing shell over the power unit.

Another object of the invention is to provide an improved cooling system and an arrangement for fractional horse power motors wherein electrical accessories to the motor, such as the condenser, interrupter, and resistance for a speed governor are located outside the path of air passing through the motor, and along with the transmission are mounted within a finishing shell and cooled with a continuous bath of air by the same fan cooling the motor.

These being among the objects of the invention, other and further objects will become apparent from the drawings, the description relating thereto, and the appended claims.

Referring now to the drawings,

Fig. 1 is a fragmentary sectional view in which the section is taken vertically through the longitudinal center of a food mixer illustrating an embodiment of the present invention;

Fig. 2 is a section taken upon the line 2—2 in Fig. 1;

Fig. 3 is a section taken upon the line 3—3 in Fig. 1, illustrating the construction of the selector valve preferably employed in the invention;

Fig. 4 is a vertical section through the transmission portion of another embodiment of the invention;

Fig. 5 is a section taken upon the line 5—5 in Fig. 4;

Fig. 6 is a vertical section illustrating another construction by which the food processing drive shafts can be mounted in place;

Fig. 7 is a section illustrating another construction in which the gear chamber is a hard metal insert in a soft metal casting, and

Fig. 8 is a section taken upon the line 8—8 of Fig. 4.

Referring now to the drawings in further detail, the power unit 10 is shown disposed in its working position as mounted upon the support 11 to overhang a bowl 12 rotatably mounted on a turntable 13. The turntable 13 is pivoted as at 14 on the base 15 and the lower end of the support is rigidly secured to the base as at 16 in a suitable manner. When the unit is in its working position the beaters 17, preferably interdigitating beaters, depend and are disposed in the bowl to agitate the contents thereof.

A handle 18 is releasably secured to the power unit, as more particularly described later, and at its forward end conceals in mutually supporting relationship the front end of the power takeoff socket 20 where it extends through the shell 21 for this purpose. Removal of the handle provides access to the juicer attachment shown in phantom 22, or a meat chopper shown in phantom 23.

Power unit

The power unit 10 comprises the shell 21, a prime mover 24, a transmission 25, the removable handle 18, just mentioned, a speed governor 26, and preferably two downwardly extending parallel flanges 27 upon the shell 21 spaced from each

other to straddle and receive the top of the support 11.

Prime mover

Briefly stated, the prime mover 24 in turn comprises a stator 28 and a rotor or armature 30 supported with respect to each other in operative position by bolts 31 and spacer sleeves 32 secured to spaced end markers 33 and 34, one of which 34 is a part of or is secured to the transmission 25.

Self aligning armature bearings 35 are mounted in the end members and a brush holder 36 is also carried by the bolts and spacers where the brushes 37 may cooperate in the usual manner with the commutator 38.

As more particularly shown in Fig. 1 the rear end member 33 is a stamped plate having a central opening 40 and laterally spaced openings 41 to receive the ends of the bolts, and is provided with arcuate perforations 42 which allow for the passage of air through the end member.

The bearing 35 has a preferably spherical or rounded contour over a portion of its outer surface, which portion has a greater diameter than the opening 40 so that the bearing can be disposed to rest and be supported in the opening where it is held in place by a stamped retainer 43 riveted to the end member as at 44. The retainer has spring fingers 45 which hold the bearing member in place and one of the spring fingers has a detent 46 therein which engages in a longitudinal slot 47 upon the bearing to prevent relative rotation under the influence of the rotating shaft.

In addition to the bearing retainer, the rivets 44 are also employed to secure a bracket 48 to the end member to provide a support for the weight of the motor at the rear end thereof. This bracket is bent at its outer end at a point 50 and to an angle suitable to engage and follow the contour of a supporting element which in the device shown is the inner wall of the shell 21. The casing and bracket may be secured together by a machine screw 51 threaded into the bracket as at 52 and adapted to receive a rubber grommet 53 for cushioning the parts and absorbing sound.

The rivets 44 also secure to the rear member an air deflector 54 upon the front face of the bracket to encompass the blades of the fan 55 and deflect outwardly and forwardly the air coming through the openings that is propelled by the fan for circulation.

A cardboard member 56 is received upon the bell-shaped portion of the deflector, and the marginal edges of the cardboard engage the inside of the shell 21 to provide a barrier preventing circulation of air around the edge of the bell and back through the opening 42. Preferably, the cardboard is located in the housing where, mechanically speaking, if it tends to move in one direction, it wedges itself against the deflector 54, while if it moves in the opposite direction it wedges itself against the shell 21, thereby being held rigidly in place with no further pressure upon it than the air which it controls and its inherent stability. The barrier being made of cardboard, this arrangement permits assembly without rattles developing in the products also.

Referring now to the means by which the motor elements are supported at the front end, like numerals refer to like or identical parts to the extent that the elements correspond. The two self aligning bearings are self lubricating, being made of porous metal and a felt wick 58 is held in contact with them by the spring fingers 45 so that once the wick is saturated with oil, the lubrication of the bearing is maintained for long periods of service, and where the forward bearing may be exposed to the escape of any of the liquid medium employed in the transmission the felt wick also prevents leakage.

A bracket 48*a*, somewhat similar to 48, is employed at the forward end to support the motor and transmission in the shell. It is preferred that the supports 48 and 48*a* constitute the sole support of the prime mover and transmission with the one at the front engaging the shell, preferably at spaced points, and the one at the rear engaging the shell at only one point. The rods 31 upon the motor parts are supported and threaded at the front to be received in the end member 34 and project rearwardly parallel with each other, preferably in this instance, in a vertical plane. The spacers 32 comprising short sleeves, are then slipped on the rods, followed by the brush support 39, then a second set of spacers, the stator 28, then more spacers, the rear end member and upon one of the bolts an insulating member 60 which carries the spring arms 61 and 62 of the speed governor which now will be described.

Speed governor

The speed governor 26 is mounted on the end of the armature shaft 63 where it extends beyond the rear bearing 35 and comprises a centrifugally responsive device, two contacts 64 and 65 by the carried spring arms 61 and 62 that are mounted at spaced points upon the insulating member 60 just mentioned, and an adjustable element 66 for varying the position of the arm 62 in relationship to the arm 61.

The responsive device comprises a circular plate 67 provided with radially disposed vanes 68 upon one side. Over the vanes is secured marginally, as by brazing, a cup-shaped member 70 having a flexing end wall 71 and a bellows type side wall 72 so that the center of the end wall and the sidewall flex independently of each other.

A spring 73 is disposed between the plate and the end wall at the axis of rotation to urge the center of the end wall away from the plate. The exposed face of the end wall receives a conical end thrust member 74 whose apex is disposed at the axis of rotation and engages the spring arm 61 under the tension present in the spring arm and under that which is created by the spring. The conical member is held in place permanently as by brazing.

The plate is slightly concave and is provided with an opening 75 at the center of the concavity and a cylindrical flange 76 by which it is mounted upon the shaft. The space between the plate and member is filled with a liquid 77, preferably an oil, and all the air is permitted to escape through the opening 75. During filling operation the spring 73 will have expanded the compartment quite measurably and after all the air is replaced with oil the assembly is placed in a form and collapsed to an exact extent to remove surplus oil from the compartment, after which the opening 75 is sealed.

Thereafter, when released from the form the expansion force exerted by the spring 73 will force the point of the member 74 outwardly and collapse the side wall bellows 72 inwardly. When the device is rotated by the motor shaft the oil 77 in the compartment centrifugates to expand the side wall bellows 72 under the influence of

which the end wall 70 is drawn inwardly at the center. The vanes 68 keep the contents of the compartment in step with the speed of rotation of the shaft 63 and in order to accentuate their action the position of the vanes may be such that they are canted slightly from radially with the outer edge trailing a true radius. With this arrangement, as the motor speeds up the vanes will tend to force the oil outwardly and as the motor slows down the oil will overtake the vanes and be moved by them inwardly. As the motor slows down the reverse will take place, thereby inducing a relative axial movement of the bearing point in relationship to variations in the speed of the motor.

This relative movement of the bearing point is used to control the make and break of the contacts 64 and 65. The contact 65 is adjusted by the cam represented diagrammatically at 66 to vary the point in the speed curve of the motor at which a break between the contacts 64 and 65 takes place. These contacts comprise a switch connected in series with the motor windings and in parallel with a condenser 78 and a resistance 80 that cushions the electrical drop in the motor circuit when the contacts are separated and also to suppress radio interference.

The cam control 66 may be operated from outside the housing in any suitable manner and upon the housing may be printed or inscribed instructions or indices (not shown) to assist the operator in selecting the speed adjustment he or she might desire. A start and stop switch (not shown) is controlled by the same shaft as the cam to open at the low point on the speed curve of the motor. This switch may be either a separate switch or the governor contacts 64 and 65 themselves. If the governor contacts are utilized then a suitable construction upon the cam which comes into operation at a predetermined point of rotation of the cam will accomplish the result desired.

Brush carrier unit

The brush carrier comprises a sheet metal member 36 of suitable contour having insulating members 81 secured thereto at spaced points upon which the brush supports 82 are mounted as more particularly described in my earlier application referred to. Upon opposite sides of the motor are provided brackets 83 upon the brush carrier which receive and support the condenser 78 and resistance 80 employed in the motor circuit.

With this particular construction, a unitary motor is provided which can be run or inspected upon a test block before mounting it inside of the shell.

Transmission

Two forms of the transmission are illustrated. One form is shown in Figs. 1–3 wherein the transmission 25 is illustrated as fashioned of a single casting 85 in the faces of which are cast and/or machined chambers for intermeshing gears. Passages connecting the chambers are drilled through the casting to interconnect the various chambers in a predetermined manner and to place a reservoir of liquid in circuit with the system thus provided.

The other form, Figs. 4 and 5, is one wherein the chambers for the gears are formed in separate bodies 86, 87 and 88, which bodies are machined separately and assembled with interconnecting tubes on a stamped metal member 201 and the complete assembly brazed by heat to form a single fabricated unit.

Figures 1–3

The transmission 25, illustrated in these figures, is preferably a single casting 85 of a durable metal capable of cooperating with rotating parts with minimum wear. Although a soft metal can be used, it is preferred that where a soft metal or plastic is used the chambers for the gears are preferably made of harder metal inserts 91 (Fig. 7) to be mounted and held in place by cover members 92. Where inserts are used, they are machined to receive the gears 93 and marginally ground with the gears in place to provide a close fit with the cover when the cover is secured in place against the edges of the insert.

The casting 85, shown, is one that is cored from the upper side as at 94 to provide a reservoir in and around the stock provided for receiving the gears and valve. Once charged with a supply of liquid 95 the reservoir is sealed by a cover 96 secured in place marginally by screws 97, in any other suitable manner as by swaging. The cover plate 96 has a small vent hole (not shown) to take care of expansion except where a shaft extends through it, in which case clearance around the shaft provides adequate means for venting the compartment, the vent being small enough to prevent the escape of liquid therethrough if the power unit is laid upon its side or raised to tilted position.

Lodged in the cover is a flat member 98 of aluminum, the lower end of which is submerged in the liquid 95 and the upper end located in the path of cooling air. By heat absorption from the liquid, heat conduction through the member 98 and dissipation to the air, the liquid is cooled.

A pair of gears are mounted in each cavity formed in the wall of the casting with a close clearance provided between the teeth of the gears and the wall of the cavity. In the embodiment illustrated in Fig. 6 the cavity 100 is large enough to receive a flange 101 upon the cover 102 and support it rigidly in place against dislodgement. In this particular embodiment the compartment 103 for the gears 104 is machined in the cover member 103 itself within the confines of the flange 101. With this arrangement, any wear of the gears or compartment which would result in a loss of power can be taken up by grinding down the flange 101, but whether the cover is the type shown in Fig. 6 or is a flat one designed to rest flush with the walls of the cavity or the upper edge of an insert a portion of the wall proximate the center of the gear upon both sides of the gear is relieved as at 105 and this relief vented to the low pressure side of the compartment 103 of which the gears operate, thereby reducing leakage due to pressures developed in the operation of the system.

Beyond the compartments the wall of the casting is preferably bored through into the reservoir 94 and so constructed as to receive a bearing sleeve 106 therein which can be burnished into place by a ball forced completely through the sleeve.

The boring for the bearing sleeve is done either with the gears 104 in place to serve as guides or with the bores 108 in the cover 102 serving as guides. In fact, if the covers are secured in place as where in Fig. 6 the gear compartment 103 is machined in relationship to the bores 108 therein, it is preferred that the boring operation in the casting be guided from the bore 108 in the

cover with both the bearing sleeves 106 and 106a burnished later in one operation, depending upon plant equipment and machining expedients.

A comparatively small compartment 110 is provided on the side of the casting where the motor shaft is received and the cover 111 for this compartment can be an independent part or an assembled part identified with the front end member 34 in which the front bearing 35 is received, as has already been described. If the motor and transmission construction were rigid the gear 112 could be locked tightly in place upon the end of the motor shaft 63, but it is preferred that there be a certain amount of looseness between the gear and the motor shaft, similar to a universal joint, to allow for flexing of the rods. Such a joint would include radially disposed mating surfaces similar to the Oldham coupling which would permit relative movement within the gear by the shaft without binding if they are slightly off center.

It will be appreciated that this universal coupling will permit wide tolerances regarding the shaft and gear being off center if the gear 112 is journalled in the casting 85 independently of the shaft 63. As has already been described, the rods 31 are threaded to engage in mutually supporting relationship the transmission as at 113 whereby the prime mover and transmission comprise a unitary construction upon which the shell is secured.

Upon the bottom side the cavity 114 is substantially deeper and the gears 115 therein are substantially larger in diameter to provide approximately a ten to one gear reduction ratio between the motor shaft speed and the shaft speed of the gears 115. The gears are mounted upon sleeve shafts 116 and adapted to receive beater rods 117. One of the shafts is accessible from beyond the cover plate to drive the juicer device 22.

The diameter of the gears 115 are preferably one and one-half inches so that they space the beater rods 117 approximately that distance from each other. The blades 118 on the beater rods are as large as possible within the limits of safety to clear one another.

In order to rotatably support the beater shafts the housing is provided with a pair of vertical bores 120 spaced at right angles to the longitudinal axis of the power unit or any other angle thereto that may be desired and since both assemblies are substantially the same only one need be described in detail.

In the bores 120 are located the sleeve bearings 121 burnished in place by a ball, as already described. Corresponding sleeve bearings may be provided in the cover, but where the shaft is exposed it is preferred to provide a combination bearing and seal in the form of a neoprene ring 122 as shown in the cover 123 by which the gears 115 are held in place. The beater shaft 124 comprises a tubular metal member upon which the gear 115 is secured, preferably by a pressed fit, and at its upper end the sleeve is provided with a plurality of longitudinal kerfs 125 cut radially at right angles to each other. The shaft terminating within the reservoir is provided with a metal cap 126 press fitted over the end to prevent the contents of the reservoir from draining therefrom, whereas the upper end of the other shaft terminates in a bore 127 which extends on through to receive the juicer shaft without opening into the reservoir.

With this construction the upper end of each beater rod 117 is provided with a slot 128 for receiving a latching spring 130 secured in the slots by deforming the body of the rod adjacent the slot to rivet the spring in place. The upper end of the spring is free to move radially outwardly beyond the surface of the rod to engage in the kerf 125 cut in the beater shaft sleeves. Thus, when the beater elements have their upper ends forced into the bore of the beater shaft the end of the spring is cammed into the slot 128 in the beater rod until the hump reaches registry with the kerf 125 in the end of the shaft, whereupon it springs into the kerf and the beater rod 117 and the beater blades 118 are thereby retained in proper rotative position and supported against inadvertent dislodgement. The kerfs 125 in the two beater shafts are so located in relationship to the meshing of the two gears that the blades upon the beater rods mesh in proper interdigitating relationship for mixing the food ingredients. Immediately below the openings into which the beater rods are to be received in the beater shafts the finishing shell is perforated as at 131 with sufficient clearance to permit the ready insertion and removal of the beater rods. This is also the case with the shell over the juicer opening, see opening 132 provided in the shell for receiving the juicer support.

Upon the front side of the casting the compartment 134 provided there receives a pair of gears 135 whose diameter is as large as possible and whose depth of tooth and thickness of gear is such as to provide a speed reduction ratio of 300 to 1 in relation to the motor shaft speed. As in the other instances these gears are preferably mounted upon shafts 136 which are journalled in both the casting 85 and the cover 137. The gears being of such large size, it is preferred to provide a bearing 138 for one of the shafts in the cover 137 without going clear through the cover thereby eliminating the danger of fluid leaking through while the food mixer is idle. The other shaft 140 of the gear extends forwardly through an opening 141 in the cover, in which it is journalled, into the flange portion 20 adapted to receive in supported relationship the hub of a low speed food processing device, such as the meat chopper indicated at 23.

The flange 20 defines a socket 142 of a cross sectional contour having flat portions upon opposite sides to mate with the correspondingly shaped hub member to prevent relative rotation between the hub and the socket.

The power shaft 140 is provided with a large cylindrical portion 143 upon which one of the gears 135 is received and the portion 144 which extends into the socket is provided with a rectangular slot 145 for engaging with the shaft of the food processing tool.

The flange 20 extends through the outer shell 21 and at its outer end its outer surface is correspondingly flattened to engage in a mating socket 146 upon the handle 18 so that the handle is supported against relative rotation when fastened in place.

In this connection it might be well to describe the manner in which the handle is secured in place. At the rear end the handle is provided with a reduced end portion 147 received in a complementary socket 148 provided by an element 150 that follows the contour of the handle and is secured at the rear end of the casing as at 151.

With this construction the handle is brought into supporting relationship with respect to the power unit by a single unidirectional movement

in which the power takeoff flange 20 engages the socket 146 and the extension 147 engages the socket 148. In this position the handle is held in place by a latch 152 the forward end 153 of which extends through the handle and the inner end of which is formed in the shape of a hook 154 to engage an ear 155 stamped from the shell member, the operation of the latching handle being more extensively described and claimed in the Behar Patent No. 2,262,912, reference to which is hereby made.

Referring to Fig. 3 a cylindrical valve compartment 160 is bored transversely into the side of the transmission to receive a spool valve 161 controlled by a shaft 162 threaded into a retainer 163. The shaft is circumferentially grooved to cooperate with a spring detent 165 mounted upon the retainer and is threaded with a plurality of threads 166 to provide rapid axial movement with slight rotary displacement. The shaft 162 extends beyond the shell 21 where it receives a manual control 167 which can be keyed to the shaft for relative rotary displacement without axial displacement.

In the arrangement of compartments 110, 114, 134 described, and the location of the spool valve 161 mentioned, a passageway 170 can be drilled from the output side of the compartment 100 to a port 171 in the valve depending upon what direction the motor rotates to provide a hydraulic flow and pressure. Furthermore, passages 172 and 173 can be drilled into the valve chamber from the other compartments 114, 134, respectively, depending upon the direction in which the driven shafts are to be rotated. The inlet 174 of the compartment 110 is drilled into the reservoir 94 at its lowest point and the outlets 175 of the compartments 114 and 134 are drilled to empty into the reservoir 94, as may be desired.

It is preferred that the ports controlled by the spool valve be selectively opened to the supply of fluid under pressure separately and both ends of the spool are open to the reservoir 94 to balance the spool and prevent escape of fluid, a passage 176 through the spool being provided for this purpose with the bore 160 opening into the reservoir.

Furthermore, it will be appreciated that the power takeoff gears 135 are arranged to be spaced vertically to locate the socket 20 in the center of the power unit at as high a point as possible so that maximum clearance is provided below it for receptacles. The construction by which the juicer bowl and shaft is secured in operative position upon the power unit is somewhat similar to that shown in my earlier invention already mentioned. The juicer support has a cylindrical member 180 that fits into a vertical sleeve 181 secured to the cover 96 above the beater shaft where the kerf can be engaged in drive relationship by the shaft of the reamer (not shown). The manner in which the juicer bowl received in the sleeve 181 is indicated in broken lines as being one wherein the downwardly facing end 182 upon the member 180 engages an upwardly presenting shoulder 183 (Fig. 4) upon the supporting sleeve 181. The upper end of the supporting sleeve is cut away as at 184 to mate with and be received in an opening 132 in the shell for the mutual support of the shell and the transmission at this point.

Figures 4 and 5

In the embodiment of the transmission chosen to illustrate the embodiment of the invention represented in these figures, the gear compartments are formed in a manner somewhat similar to the construction shown in Fig. 7 wherein inserts 200, having substantially the same thickness as the gears, are used. A heavy sheet metal container 201 is provided as a central member, the outer faces of which, where feasible, serve as one wall of the several compartments with the gears 112 and 135 and inserts 200 resting thereagainst. The other wall of each of the compartments comprises cover members similar to those already described in connection with Figures 1, 2 and 3, which cover members can be held in place by bolts but are preferably held in place by collets 203 whose edges are brazed to one or the other, or both the container and the cover members, as indicated at 204. At the bottom of the container where the gears 115 are supported, a secondary plate 205 is supplied and secured to the container to form the inner wall of the pump compartment where the container wall is not of sufficient expansion to serve for this purpose. The collet in this instance is brazed to the plate 205 at their contiguous marginal edges. Wherever it is desirable to provide journals in the wall of the container the wall is perforated with the stock forced inwardly and expanded to provide cylindrical flanges 206 in which the bearings are received and burnished into place as already described.

The valve compartment comprises a section 207 of a tubular stock held in place by being brazed to the container wherever it contacts the container and by small tubes 208 which serve as conduits connecting the several compartments in the fluid circuits.

As will be seen from Figures 4 and 5 the beater drive shafts 124 extend vertically through the container to be journalled at both ends. With this construction, sufficient space is provided between them to receive part of the valve compartment for purposes of a compactness of design. The wall of the tube 207 is cut away, as at 210, to clear one of the shafts and with the valve member 161 located in place before the shafts are assembled, the shafts 124 serve as end stops for the valve movement.

In order to connect the inlet of the pump gears 121 at the lowest point in the container 201 a section of conduit 211 is provided and in order to prevent contamination of the hydraulic fluid stored in the container a suitable cover member 212 is provided in which the juicer support sleeve 181 is received and secured in place as by swaging at 213.

In converting the assemblage of parts shown and described in connection with Figures 4, 8 and 5, all of the parts shown except the beater rods 117 and the motor shaft 63, but including the motor supports 31, are located and held in their respective positions as illustrated, with rings of brazing metal disposed where brazed joints are desired, and this assemblage is placed in a brazing oven where all the parts are brought to brazing temperature. An amount of brazing metal is provided at any one point which is sufficient to provide for the joints without the metal flowing to other parts when heated.

After brazing and cooling of the transmission the container is filled with hydraulic fluid and all the gears are mechanically run-in independently for a short period of time upon the test block, after which the motor parts are assembled upon the motor supports 31 in the manner already described. Then the assembly is test run

hydraulically with suitable adjustments being made as needed. If the motor and transmission are to be placed in inventory they are wrapped in paper and placed in cardboard containers as they come from the test block. On the other hand, if they are to be used immediately in a food mixer the shell, which will now be described, is assembled on them and packed for shipping.

Shell

As more particularly described in my co-pending application the shell 21 is constructed preferably of two die stamped members 214 secured together marginally by suitable means after the combined transmission and motor unit are secured in place in the lower shell member, it being appreciated that the upper shell before being secured to the lower shell is slipped over the flange 28 and into place on the juicer support sleeve 181 before the rear end of the shell is lowered into contact with the lower shell. Suitable openings (not shown) are provided for access to the brush holders for repair and replacement of the brushes, and the control 167 for the valve is located at an aperture 215 provided where the mating edges of the shell meet over the valve construction.

The lower shell is perforated at the rear between the flanges 27 as at 216 for the admission of air in a concealed way to the space behind the deflector 54 and the lower shell is also provided with outlet openings 217 at the front end to permit escape of air after it has passed over the motor to cool it.

As mentioned heretofore, it is preferred to have the motor unit mounted upon the motor shell at three points. It will be noticed that the forward points are proximate the openings 131 where the shafts pass through the shell 21. With the use of resilient mountings the result can be one in which the socket flange 28 and juicer support sleeve 181 are tightly held in contact with the upper shell so that there is little opportunity for a looseness to develop which would cause a rattle or unpleasant noise.

Two longitudinally spaced bosses 226 are provided upon each side of the support 11 at the top thereof to engage the inner faces of the downwardly projecting flanges 27 to prevent the flanges from scuffing the support and also to align the power unit longitudinally against lateral displacement. The flanges otherwise are shaped to follow the contour of the support in a manner pleasing to the eye and a pin 221 is disposed transversely through the support below the bosses. The lower edges of the flanges 27 are so cut in the stamping operation as to provide a hook engagement 222 which engages the pin, the hook being an upwardly opening one at the end of a horizontal slot through which the pin is slid into place as the power unit is moved rearwardly to bring the beaters into operative position.

Operation

In operation, after the reservoir has been filled to a predetermined level before the cover is installed or has been filled through one of the journals before the gears are secured in place, operation of the prime mover will drive gears 112. Hydraulic fluid will be drawn by the gears 112 from the reservoir and forced through under a positive displacement pressure to the inlet port of the valve cylinder 166 from which point the fluid under pressure may be directed, to supply the beater or gears 115, or the power takeoff gears 137, depending upon the setting of the valve. If supplied to the beater gears the liquid under pressure rotates the meshed gears in its escape to the reservoir along the outer edge of the compartment and thereby drives the interdigitating beaters 17. In event the valve is set to supply the liquid under pressure to the power takeoff gears, the same action takes place with those gears to rotate those gears at a much slower speed, since the reduction in shaft speed is accomplished in relation to the quantity of liquid supplied by the pump each revolution to the quantity of liquid necessary to displace the motor gears each revolution. Suitable liquid seals for the shafts below the level of the hydraulic fluid may be provided if desired.

Thus, from the description had and the designation of the operations performed, it will be seen that the objects and purposes mentioned and claimed herein are accomplished by the embodiment defined, and although the description has been lodged in terms somewhat specific in details for a better understanding of the embodiment illustrated, the several embodiments of the invention suggested and described will be apparent to those skilled in the art that various and further uses, modifications and changes may be made without departing from the spirit and substance of the invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. A power unit for food mixers comprising a prime mover having a drive shaft, a transmission housing in which one end of the shaft is received, a sealed chamber in the housing having a pair of meshed gears therein, an inlet and an outlet for said chamber, a valve chamber having an inlet connected to said outlet, a plurality of outlets from said valve chamber, a valve in the valve chamber for connecting the valve chamber inlet with the outlets selectively, and a plurality of compartments having a pair of intermeshing gears mounted therein, said last mentioned compartments each having an inlet therein and an outlet, and means for interconnecting the outlet in the last compartments with the inlet of the first mentioned chamber including a reservoir for a liquid medium.

2. In an electric motor structure, a drive shaft and a transmission driven therefrom comprising a unit having power delivering shafts upon three sides of the transmission and a power receiving shaft, a pair of intermeshing gears upon one side disposed perpendicular to the power receiving shaft in a pump compartment upon one side of the unit, a pair of intermeshing gears driving one of the power delivery shafts and disposed horizontally parallel with the lower side of the unit in a motor compartment having an inlet and an outlet, a pair of gears driving another of said power delivering shafts and disposed parallel with a vertical side of the unit in a motor compartment having an inlet, a reservoir of hydraulic fluid in the unit, means for supplying said fluid to the pump compartment, and means for interconnecting the pump compartment with said inlets.

3. In an electric motor structure, a drive shaft and a transmission driven therefrom comprising a unit having a power receiving shaft and power delivering shafts upon a plurality of sides of the transmission, a pair of intermeshing gears upon one side disposed perpendicular to the power delivering shaft in a pump compartment

upon one side of the unit, a pair of intermeshing gears disposed horizontally parallel with the lower side of the unit in a motor compartment having an inlet and an outlet, a pair of vertically spaced gears disposed parallel with a vertical side of the unit in a motor compartment having an inlet and an outlet, a reservoir of hydraulic fluid in the unit, means for supplying said fluid to the pump compartment, and means for interconnecting the pump compartment with said inlets, a power shaft extending from the upper gear of said pair of vertical gears and constructed and arranged to drive a food cutting tool.

4. A power unit for food mixers comprising a drive, a transmission housing having a reservoir for a hydraulic fluid, a pair of meshed gears, means for mounting said gears in sealed relation in the housing including an element secured to said housing and providing a compartment having an inlet supplied by hydraulic fluid and an outlet opening, shaft means extending through said element for rotating said gears to establish a hydraulic pressure at said outlet opening, means for relieving the shaft means to the pressure of the reservoir at a point intermediate the gears and the point where said shaft means is exposed exteriorly of said element, a pair of horizontally disposed intermeshed gears, a pair of vertical shafts rotatably driven by said gears in stepped relation and so constructed and arranged as to receive food processing tools in detachable supported relation, means for driving said gears by said hydraulic fluid under pressure including a compartment sealing the gears having an inlet upon one side of the last said pair of gears connected to said outlet, and an outlet to the reservoir upon the other side of said last pair of gears.

5. A power unit for food mixers comprising a drive, a transmission housing having a reservoir for a hydraulic fluid, a pair of meshed gears, means for mounting said gears in sealed relation in the housing including an element secured to said housing and providing a compartment having an inlet supplied by hydraulic fluid and an outlet opening, shaft means extending through said element for rotating said gears to establish a hydraulic pressure at said outlet opening, means for relieving the shaft means to the pressure of the reservoir upon the compartment side of the point where said shaft means is exposed exteriorly of said element, a pair of horizontally disposed intermeshed gears, a pair of vertical shafts rotatably driven by said gears in stepped relation and so constructed and arranged as to receive food processing tools in detachable supported relation, means for driving said gears by said hydraulic fluid under pressure including a compartment sealing the gears having an inlet upon one side of the last said pair of gears connected to said outlet, and an outlet to the reservoir upon the other side of said last pair of gears, means for venting the bearing surfaces of the last mentioned shafts interiorly of the housing to the reservoir.

6. A power unit for food mixers comprising a prime mover having a drive shaft, a transmission housing, a pair of meshed gears, means for mounting said gears in sealed relation in the housing including a compartment having an inlet opening and an outlet opening, means for rotating the gears by the drive shaft, means in said transmission housing including a closed reservoir for supplying hydraulic fluid to said inlet, a pair of vertically disposed shafts journalled in said transmission housing for receiving food processing tools in detachable supported relation, a pair of intermeshed gears for driving said shafts in opposite and stepped rotation, means for mounting said last pair of gears in sealed relation in the housing including a compartment having an inlet in communication with said outlet and an outlet in communication with said reservoir.

7. A power unit for food mixers comprising a prime mover having a drive shaft, a transmission device including a pump housing and a motor casing, a pair of meshed gears, means for mounting said gears in sealed relation in the housing including a compartment having an inlet opening and an outlet opening, means for rotating the gears by the drive shaft, compartment means for said transmission device defining a closed reservoir for hydraulic fluid, conduit means for supplying hydraulic fluid to said inlet from the compartment, a pair of vertically disposed shafts journalled in said casing and receiving food processing tools in detachable supported relation, a pair of intermeshed gears for driving said shafts in opposite and stepped rotation, means for mounting said last pair of gears in sealed relation in the casing including a compartment having an inlet in communication with said outlet and an outlet in communication with said reservoir, means for cooling the hydraulic fluid and prime mover including a fan driven by said prime mover.

8. A power unit for food mixers comprising a prime mover having a drive shaft, a transmission housing, a pair of meshed gears, means for mounting said gears in sealed relation in the housing including a compartment having an inlet opening and an outlet opening, meas for rotating the gears by the drive shaft, means in said transmission housing including a closed reservoir for supplying hydraulic fluid to said inlet, a pair of vertically disposed shafts journalled in said transmission housing and receiving food processing tools in detachable supported relation, a pair of intermeshed gears for driving said shafts in opposite and stepped rotation, means for mounting said last pair of gears in sealed relation in the housing including a compartment having an inlet in communication with said outlet and an outlet in communication with said reservoir, some of said shafts being exposed to receive tools exteriorly of the housing, and means for venting to the reservoir at points adjacent their centers, those of the above gears that are disposed on exteriorly exposed shafts.

9. A power unit for food mixers comprising a prime mover, a transmission associated with said prime mover and having a fluid reservoir, an element defining a pump compartment, a pair of meshed gears mounted in the compartment, means for driving one of said gears by said prime mover, a casing defining a fluid motor compartment, a pair of vertically disposed intermeshed gears in said fluid motor, a shaft driven by one of said gears, said casing having a socket in an outer portion into which a tool may be detachably received in driven relationship with the shaft, circuit means including a hydraulic medium by which hydraulic fluid under pressure is supplied to the motor compartment.

10. A power unit for food mixers comprising a prime mover, a transmission associated with said prime mover and having a fluid reservoir, an element defining a pump compartment, a pair

of meshed gears mounted in the compartment, means for driving one of said gears by said prime mover, a casing defining a fluid motor compartment, a pair of vertically disposed intermeshed gears in said fluid motor, a shaft driven by one of said gears, said casing having a socket in an outer portion into which a tool may be detachably received in driven relationship with the shaft, circuit means including a hydraulic medium by which hydraulic fluid under pressure is supplied to the motor compartment, said last pair of gears being vertically spaced and the shaft driven by the upper of the pair of gears.

11. A power unit for a food mixer comprising a sheet metal shell, a fluid pump and casing therein brazed to said shell, means for securing a prime mover to said shell in mutually supported relationship with the shaft thereof received in said casing, a fluid motor casing secured to said shell and having a pair of intermeshed gears therein rotating a pair of shafts in opposite directions in stepped relation and so constructed and arranged as to receive food processing tools detachably therein, a supply of hydraulic fluid in said shell, means for cooling said fluid including an air propelling device driven by the prime mover, and means placing said casings and fluid supply in circuit with one another to transmit power developed in the pump casing to the gears in the motor casing.

12. A transmission comprising a sheet metal member defining a reservoir for a hydraulic fluid, said member having a plurality of openings therein, a hydraulic positive displacement pump casing disposed in one of said openings and receiving through said opening a shaft by which the pump is operated, a fluid motor casing disposed in another of said openings, a power drive shaft accessible through said opening and rotatably mounted in said motor casing, means connecting the casings and reservoir in circuit, said casings, member and said means being secured together as an integral assembly by brazing, said brazing flowing between associated elements to maintain clearance for the moving parts of the pump and motor, and means carried by said assembly for supporting a prime mover upon the assembly.

13. A power unit for a food mixer the combination of a shell, prime mover and integral transmission device, said device comprising a unitary housing having a plurality of compartments therein and a reservoir for storing hydraulic fluid, one of said compartments receiving fluid pumping elements therein, means secured to said device for supporting the prime mover in driving position for driving said pumping elements, a motor means driven by the fluid pumped by said elements for operating a food processing tool, means for cooling said prime mover and said hydraulic fluid including a propeller driven by said prime mover in the shell for conducting air from one to the other of said device and prime mover.

14. A power unit for food mixers comprising a drive, a transmission device including a reservoir for a hydraulic fluid, a pump for hydraulic fluid including a pair of meshed gears, means for mounting said gears in sealed relation in a pump housing including an element secured to said housing and providing a compartment having an inlet supplied by hydraulic fluid from the reservoir and an outlet opening, shaft means connected to said drive and extending through said element to engage one of the gears for rotating said gears to establish a hydraulic pressure at said outlet opening, means for relieving the shaft means to the pressure of the reservoir at a point intermediate the face of the gear and the point where said shaft means is exposed exteriorly of said element, a pair of horizontally disposed intermeshed gears, a pair of vertical shafts rotatably driven by said gears in stepped relation and so constructed and arranged as to receive food processing tools in detachable supported relation, means for driving said gears by said hydraulic fluid under pressure including a casing having a compartment sealing the gears and provided with an inlet upon one side of the said last pair of gears connected to said outlet, and an outlet to the reservoir upon the other side of said last pair of gears.

15. In a food mixer having a prime mover, a transmission associated with said prime mover for driving food processing tools including a reservoir for hydraulic fluid, hydraulic pump means driven by said prime mover and having an inlet and an outlet for hydraulic fluid, hydraulic motor means having an inlet for hydraulic fluid connected to the outlet of said pump means by which hydraulic fluid under pressure is transmitted from the pump means to the motor means to drive the motor means, and conduit means interconnecting the motor means and the inlet of said pump means including said reservoir, said reservoir retaining a quantity of hydraulic fluid above the inlet of said pump means when the food mixer is in operation, a drive element driven by said motor means and exposed at one end to receive a detachable food processing tool in driven relation, and real means for returning to said conduit means hydraulic fluid escaping to the surface of said element between the motor and where said element is exposed to the outside.

16. In a food mixer having a prime mover, a transmission including a reservoir for hydraulic fluid, hydraulic pump means driven by said prime mover and having a fluid inlet and a fluid outlet, hydraulic motor means for driving two food processing tools including two intermeshed gears rotating in opposite directions for driving the tools in opposite directions about normally vertically disposed axes of rotation, said motor including a fluid inlet and a fluid outlet, conduit means interconnecting the inlet of the pump and the outlet of the motor, and second conduit means interconnecting the outlet of the pump and the inlet of the motor, one of said conduit means including communication with said reservoir.

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