Aug. 31, 1965 G. SCHAFRANEK 3,203,352

MULTIPLE PUMP ASSEMBLY

Filed May 9, 1963 2 Sheets-Sheet 1

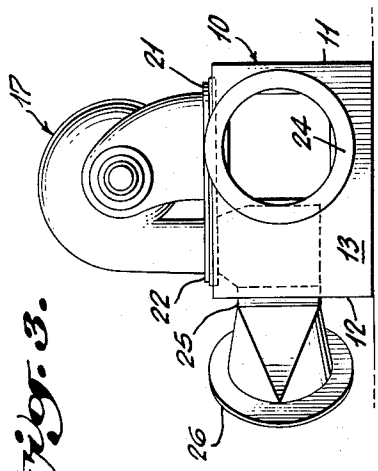

Fig. 3.

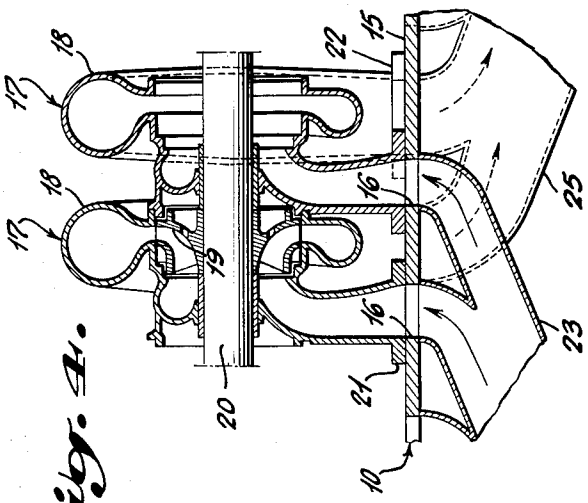

Fig. 4.

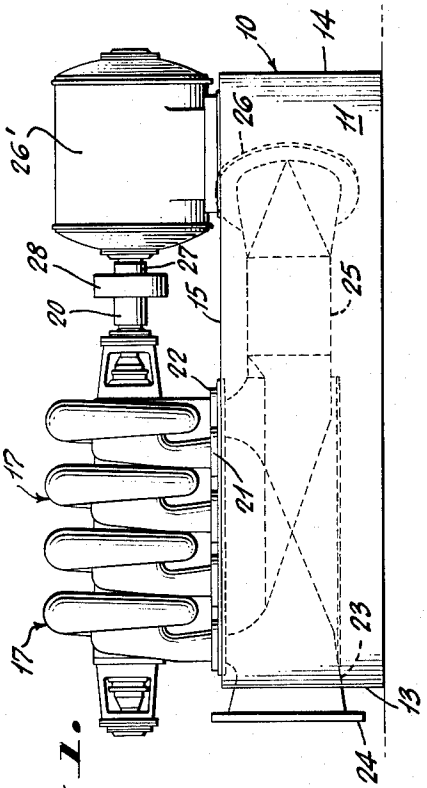

Fig. 1.

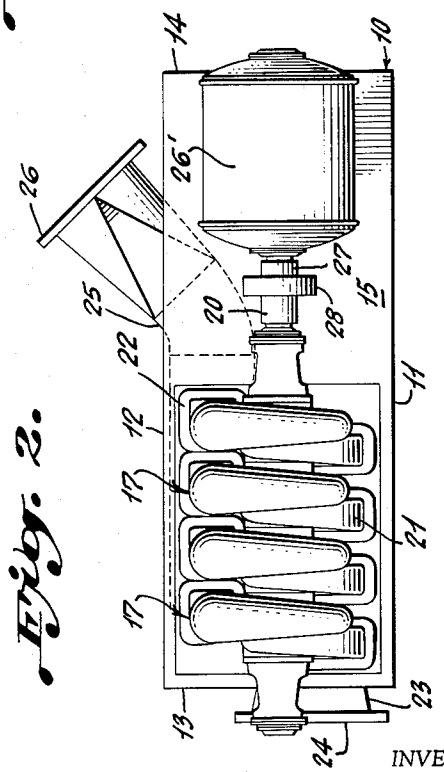

Fig. 2.

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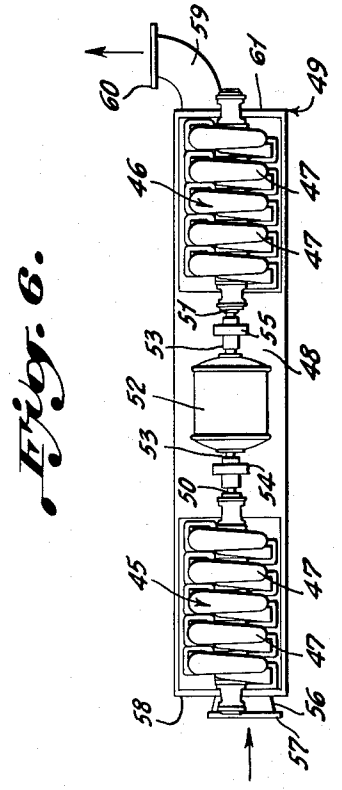

Fig. 6.

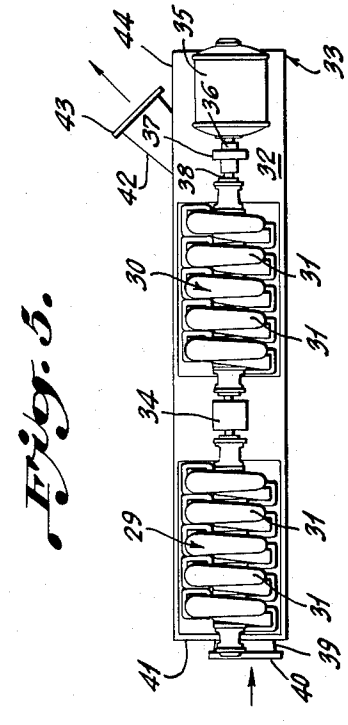

Fig. 5.

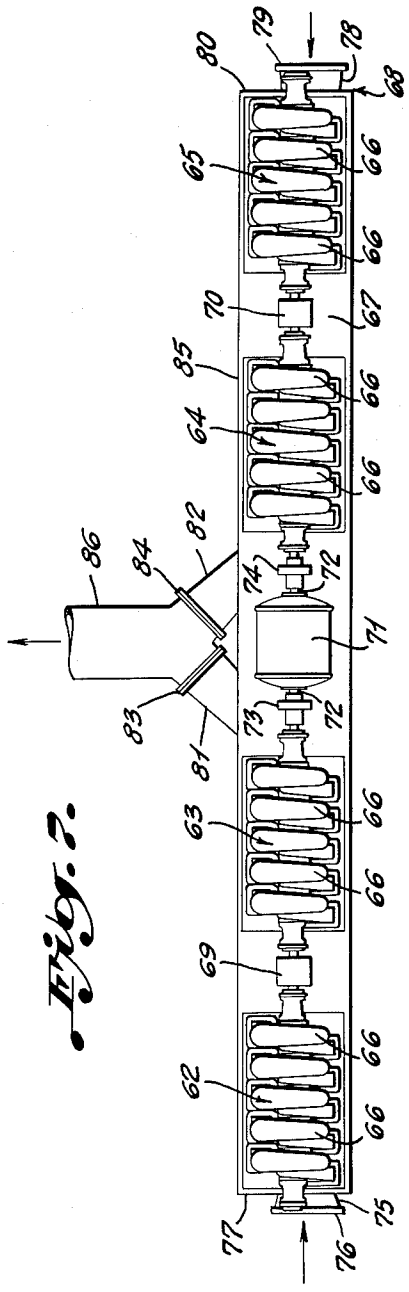

Fig. 7.

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MULTIPLE PUMP ASSEMBLY

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5 Claims. (Cl. 103—87)

This invention relates to pumps, and more particularly to a multiple pump assembly in which a plurality of individual rotary pump units driven from a common shaft are mounted on a common base, and in which the intake fittings of the pumps are connected to a common intake conduit, and the discharge fittings are connected to a common discharge conduit.

It is advantageous, both from the standpoint of efficiency of operation, and from the standpoint of economy to utilize a plurality of rotary pumps of relatively small size in order to provide the desired capacity, rather than to utilize a single large pump or to utilize a pump with multiple rotors, since the castings of such pumps are relatively complex, and costly, and furthermore, a plurality of smaller pumps with individual discharge outlets connected to a common discharge conduit may be operated at a higher speed than a single larger pump to provide the desired volume, and in this manner more efficient and less costly pump installations may be provided. Furthermore, this type of construction permits the use of a smaller high speed electric drive motor which provides even further economy insofar as the cost of construction is concerned.

While it might seem that the utilitization of a plurality of individual pump units rather than a single large unit to provide the desired volume might result in increasing the space requirements, nevertheless, in accordance with the instant invention there has been provided a structure wherein the individual pump units are mounted on a hollow, common base with the intake and discharge conduits disposed within the base, thereby materially reducing the space requirements as compared to a structure in which the intake and discharge conduits are mounted exteriorly of the base and pump assembly.

It is accordingly an object of the invention to provide a multiple pump assembly in which a plurality of individual rotary pump units driven from a common shaft are mounted on a common base, and in which the base also serves to support the drive motor.

A further object of the invention is the provision of a multiple pump assembly including a plurality of individual rotary pump units mounted on a common base, and in which the intake openings of the pumps are connected to a common intake conduit, and in which the discharge openings are connected to a common discharge conduit.

A still further object of the invention is the provision of a multiple pump assembly in which a plurality of individual rotary pump units are mounted on a common hollow base, and in which a common intake conduit is disposed within the base and connected to the intake openings of the pump, and in which a common discharge conduit disposed within the base is connected to the discharge openings of the pumps.

Another object of the invention is the provision of a multiple pump assembly in which a plurality of individual rotary pump units are mounted on an elongated, hollow, common base, there being intake and discharge conduits disposed within the base and connected to the intake and discharge openings of the pumps, the intake conduit being provided with a coupling disposed adjacent one end of the base, and the discharge conduit being provided with a coupling facing in the opposite direction and disposed at one side of the base.

A further object of the invention is the provision of a multiple pump assembly, including a pair of pump units, each unit comprising a plurality of individual rotary pumps driven from a common shaft, such pump units being supported on a common base and with a shaft bearing and coupling between the pump units.

A still fulther object of the invention is the provision of a multiple pump assembly in which a pair of pump units are provided, each unit comprising a plurality of individual rotary pums driven by a common shaft, such pump units being disposed in spaced relationship on a common base, and with a drive motor having a double-ended shaft disposed between the pump units and connected to the drive shaft of each unit.

Another object of the invention is the provision of a multiple pump assembly in which two pairs of pump units are provided, each unit comprising a plurality of individual rotary pumps, driven by a common shaft, the units in each pair being separated and mounted on a common base, and with the drive shafts connected by a coupling and supporting bearing, and with a drive motor having a double-ended shaft disposed between the inner units of each pair and connected to the drive shafts thereof.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a side elevational view showing a plurality of individual pumps providing a pump unit mounted on a common base, together with a drive motor mounted on such base, and with intake and discharge conduits disposed within the base;

FIG. 2 a top plan view of the pump assembly shown in FIG. 1;

FIG. 3, an end elevational view of the pump assembly shown in FIG. 1, and showing the disposition of the couplings on the intake and discharge conduits;

FIG. 4, a fragmentary sectional view showing two of the pumps utilized in the pump unit of FIG. 1, and also showing the manner of mounting such pumps on the common base, and the manner of connecting the intake and discharge openings to the intake and discharge conduits;

FIG. 5, a top plan view showing a modified form of the invention in which two pump units coupled together are mounted on a common base, and in which a drive motor is also mounted on the base and connected to the drive shaft of one of the units;

FIG. 6, a top plan view similar to FIG. 5, but showing a further modified form of the invention, in which a drive motor having a double-ended shaft is disposed between the pump units and coupled thereto; and,

FIG. 7, a top plan view showing a still further modified form of the invention, which in effect combines the forms shown in FIGS. 5 and 6 with a single drive motor having a double-ended shaft driving two pairs of pump units disposed on opposite sides of the motor.

With continued reference to the drawings, and particularly FIGS. 1 to 4, there is shown a multiple pump assembly constructed in accordance with this invention, and in which there is provided a hollow, elongated base **10** which may be constructed as a casting or may be fabricated from metal plates or other suitable structural elements, the base **10** having side walls **11** and **12**, end walls **13** and **14**, and a top wall **15**. A plurality of intake openings **16** are provided in the top wall **15** of the base **10**, and in a similar manner a plurality of discharge openings, not shown, are provided in the top wall **15**.

A plurality of individual rotary pumps **17** are mounted on the top plate **15** of the base **10**, and as best shown in FIG. 4, each pump **17** includes a casing **18** with a rotor

19 disposed therein, the rotors in all of the pumps 17 being fixed to a common drive shaft 20. The casing 18 of each pump is provided with an intake fitting 21 which is secured to the top wall 15 of the base 10 in communication with the intake opening 16 in the top wall 15, and also each casing 18 is provided with a discharge fitting 22 secured to the top wall 15 of the base 10 and communicating with the discharge opening provided in the top wall 15.

An intake conduit 23 is disposed within the base 10, and communicates with all of the intake openings 16 in the top wall 15 of the base 10. The intake conduit 23 may be provided with a coupling 24 disposed exterioraly of the end wall 13 of the base 10, and serves to couple the intake conduit 23 to an intake pipe. In a similar manner a common discharge conduit 25 is disposed in the base 10, and such discharge conduit is connected to all of the discharge openings provided in the top wall 15 of the base 10. The discharge conduit 25 is provided wth a coupling 26 disposed exteriorly of the side wall 12 of the base 10, and facing generally in a direction opposite to that of the coupling 24 on the intake conduit 23. The coupling 26 serves to connect the discharge conduit 25 to a suitable discharge pipe.

A common drive motor 26' is mounted on the top wall 15 of the base 10, and the drive shaft 27 of the motor 26' is connected by a coupling 28 to the common drive shaft 20 of the individual pumps 17.

It will be seen that by the above described form of the invention there has been provided a compact, multiple pump assembly in which space requirements are materially reduced by disposition of the intake and discharge conduits within the base which serves to support a plurality of individual pumps forming a unit, as well as a drive motor connected to a shaft common to all of the pumps, and furthermore, all of the intakes of the pumps are connected to a common intake conduit, while all of the discharge connections of the individual pumps are connected to a common discharge conduit, such conduits being arranged in such a manner as to reduce the space required for intake and discharge pipes connected thereto.

With particular reference to FIG. 5, there is shown a somewhat modified form of the invention in which a pair of pump units 29 and 30, each unit comprising a plurality of individual pumps 31, are mounted on the top wall 32 of an elongated, hollow base 33, the pump units 29 and 30 each having a common shaft, with the shafts coupled together and supported by a suitable bearing 34 disposed between the pump units. Also mounted on the top wall 32 of the base 33 is a common drive motor 35, the drive shaft 36 thereof being connected by a coupling 37 to the shaft 38 of the pump unit 30.

A common intake conduit 39 is disposed within the base 33, and is connected to all of the intake openings of the individual pumps 31 in the same manner as described above in connection with the first form of the invention, and the intake conduit 39 may be provided with a suitable coupling 40 disposed exteriorly of the end wall 41 of the base 33. In a similar manner, a common discharge conduit 42 is disposed within the base 33, and connected to all of the discharge openings of the individual pumps 31, and the discharge conduit 42 may be provided with a suitable coupling 43 disposed exteriorly of the side wall 44 of the base 33, with the coupling 43 facing generally in a direction opposite to that of the coupling 40.

With particular reference to FIG. 6, there is shown a form of the invention alternative to the form shown in FIG. 5 and described above, and as shown in FIG. 6 there may be provided a pair of pump units 45 and 46, each unit including individual rotary pumps 47, the units 45 and 46 being mounted on the top wall 48 of an elongated, common base 49. The pump unit 45 is provided with a common drive shaft, 50, while the pump unit 46 is provided with a common drive shaft 51.

A common drive motor 52 is also mounted on the top wall 48 of the base 49, between the pump units 45 and

46, and the drive motor 52 is provided with a double-ended shaft 53 connected by means of a coupling 54 to the shaft 50 of the pump unit 45, and connected by means of a coupling 55 to the shaft 51 of the pump unit 46.

A common intake conduit 56 is disposed within the base 49, and is connected to all of the intake openings of the individual pumps 47, and the intake conduit 56 is provided with a coupling 57 disposed exteriorly of the end wall 58 of the base 49. A common discharge conduit 59 is disposed within the base 49, and is connected to all of the discharge openings of the individual pumps 47, and the discharge conduit 59 is provided with a coupling 60 disposed exteriorly of the end wall 61 of the base 49 to provide a compact pump and drive assembly.

When it is desired to provide additional capacity, a plurality of pump units may be assembled on a common base as shown in FIG. 7, such pump units 62, 63, 64 and 65 each being composed of individual rotary pumps 66.

The pump units 62, 63, 64 and 65 are mounted on the top wall 67 of an elongated, common base 68, and the pump units 62 and 63 are provided with shafts coupled together and supported by an intermediate bearing 69, while the pump units 64 and 65 are provided with shafts coupled together and supported by an intermediate bearing 70. A common drive motor 71 is also mounted on the top wall 67 of the base 68 between the innermost pump units 63 and 64, and the drive motor 71 is provided with a double-ended shaft 72 connected by means of a coupling 73 to the shaft of the pump unit 63, and connected by means of a coupling 74 to the shaft of the pump unit 64.

A common intake conduit 75 is disposed within the base 68, and is connected to all of the intake openings of the pumps 66 comprising the two pump units 62 and 63, and a coupling 76 on the intake conduit 75 is disposed exteriorly of the end wall 77 of the base 68. In a similar manner, a common intake conduit 78 is disposed within the base 68, and is connected to the intake openings of all of the pumps 66 comprising the two pump units 64 and 65, and the intake conduit 78 is provided with a coupling 79 disposed exteriorly of the end wall 80 of the base 68.

A common discharge conduit 81 is disposed within the base 68, and is connected to the discharge openings of all of the pumps 66 comprising the pump units 62 and 63, while a second discharge conduit 82 is disposed within the base 68 and is connected to the discharge openings of the pumps 66 comprising the pump units 64 and 65. The discharge conduits 81 and 82 may be provided with couplings 83 and 84, respectively, disposed exteriorly of the side wall 85 of the base 68 adjacent the mid-point thereof, and the couplings 83 and 84 may connect to a common discharge pipe 86.

It will be seen that by the above described invention, including the various forms thereof, that there has been provided a multiple pump assembly which may be utilized for varying capacity requirements, and in which relatively small, individual rotary pumps may be employed, assembled together to provide a pump unit having the required capacity, with such unit together with a common drive motor being mounted on a common hollow base which also serves to enclose intake and discharge conduits, thereby maintaining space requirements at a minimum. This type of multiple pump assembly also permits the utilization of relatively small, individual pumps having simple, inexpensive castings and other components, and furthermore, with this type of pump assembly a relatively high speed drive motor may be employed which is less costly than a more powerful motor required for driving larger single pumps having the same capacity as the multiple pump assembly of this invention.

It will be obvious to those skilled in the art that various changes may be made in the invention, without departing from the spirit and scope thereof, and therefore the invention is not limited by that which is shown in the drawings and described in the specification, but only as indicated in the appended claims.

What I claim is:

1. A multiple pump assembly comprising an elongated hollow base, a top plate on said base, said top plate having a plurality of intake openings and a plurality of discharge openings, a common intake conduit disposed in said base and communicating with said intake openings, a coupling on said intake conduit at one end of said base, a common discharge conduit disposed in said base and communicating with said discharge openings, a coupling on said discharge conduit adjacent one side and the opposite end of said base, a plurality of separate, like pump casings disposed in axial alignment, an intake fitting and a discharge fitting on each casing, said casing being secured to said top plate with said intake fittings communicating with said intake openings and said discharge fittings communicating with said discharge openings, whereby said casings are connected in parallel, a separate and like rotor in each casing to provide a pump unit, a common drive shaft fixed to each rotor, and a drive motor coupled to said drive shaft and secured to said top plate.

2. A multiple pump assembly comprising an elongated hollow base, a top plate on said base, said top plate having a plurality of intake openings and a plurality of discharge openings, a common intake conduit disposed in said base and communicating with said intake openings, a common discharge conduit disposed in said base and commuicating with said discharge openings, a plurality of separate like pump casings disposed in axial alignment, an intake fitting and a discharge fitting on each casing, said casings being secured to said top plate with said intake fittings commuicating with said intake openings and said discharge fittings communicating with said discharge openings, whereby said casings are connected in parallel, a separate like rotor in each casing to provide a pump unit, a common drive shaft fixed to each rotor, and a drive motor coupled to said drive shaft.

3. A multiple pump assembly as defined in claim **2**, in which a pair of said pump units are disposed in spaced relationship on said top plate, the drive shafts of said units being coupled together and a shaft support bearing between said units.

4. A multiple pump assembly as defined in claim **2**, in which a pair of said pump units are disposed in spaced relationship on said top plate, said motor being disposed between said units and having a double ended shaft coupled to the shafts of said units.

5. A multiple pump assembly as defined in claim **2**, in which two pairs of said pump units are disposed in spaced relationship on said top plate, the drive shafts of each pair being coupled together and a shaft support bearing between each pair, said motor being disposed between adjacent units of said pairs and having a double ended shaft coupled to the shafts of said adjacent units.

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