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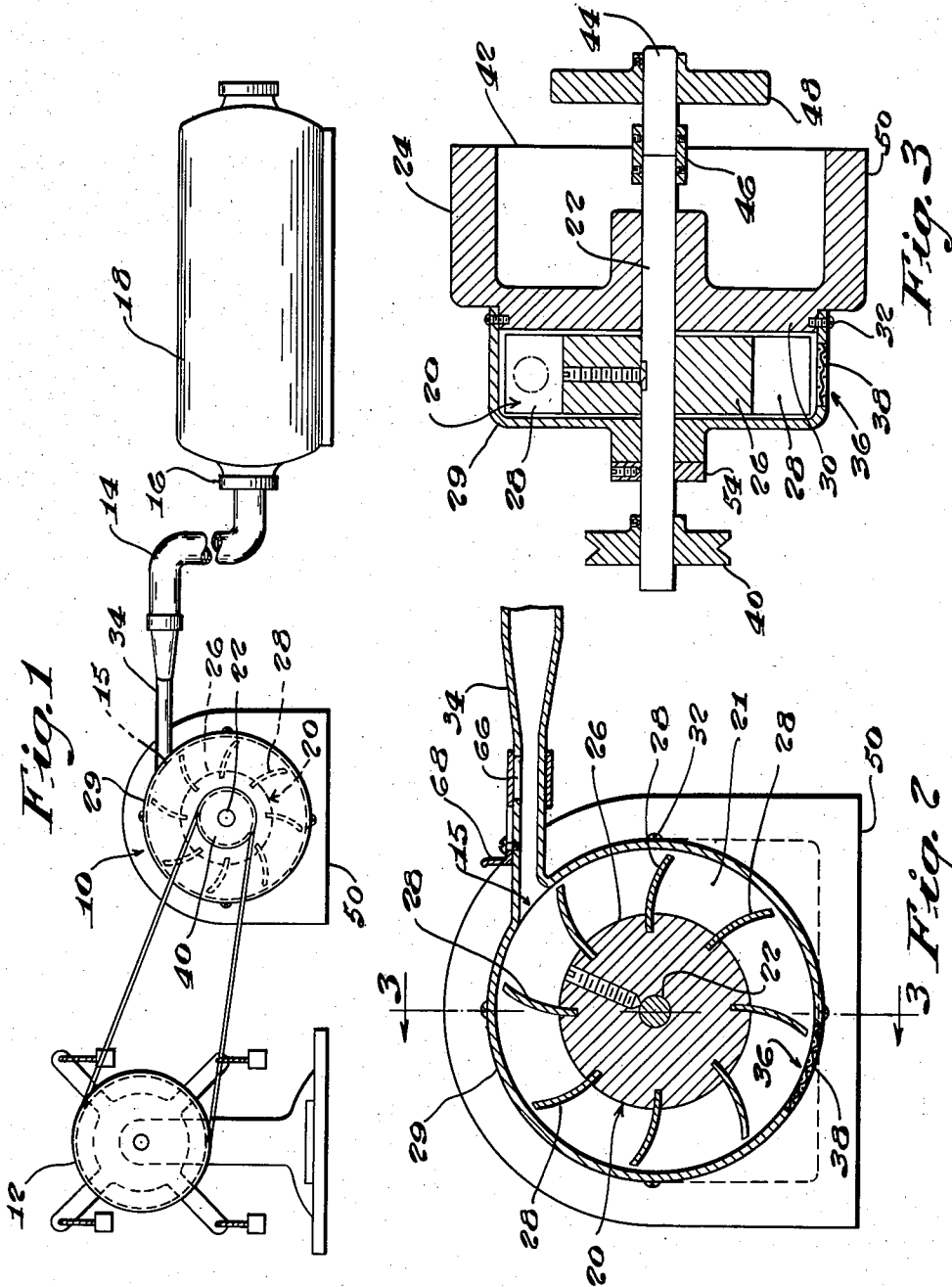
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2,471,109

PNEUMATICALLY DRIVEN POWER UNIT

Filed Oct. 2, 1945

2 Sheets-Sheet 1



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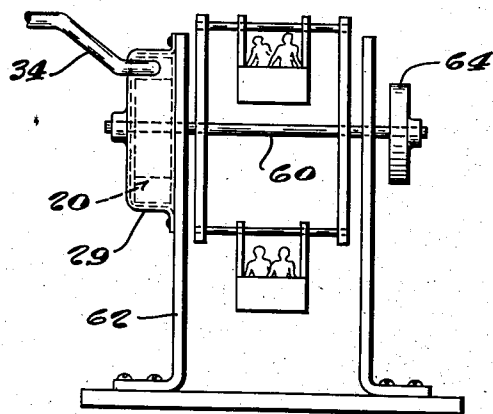
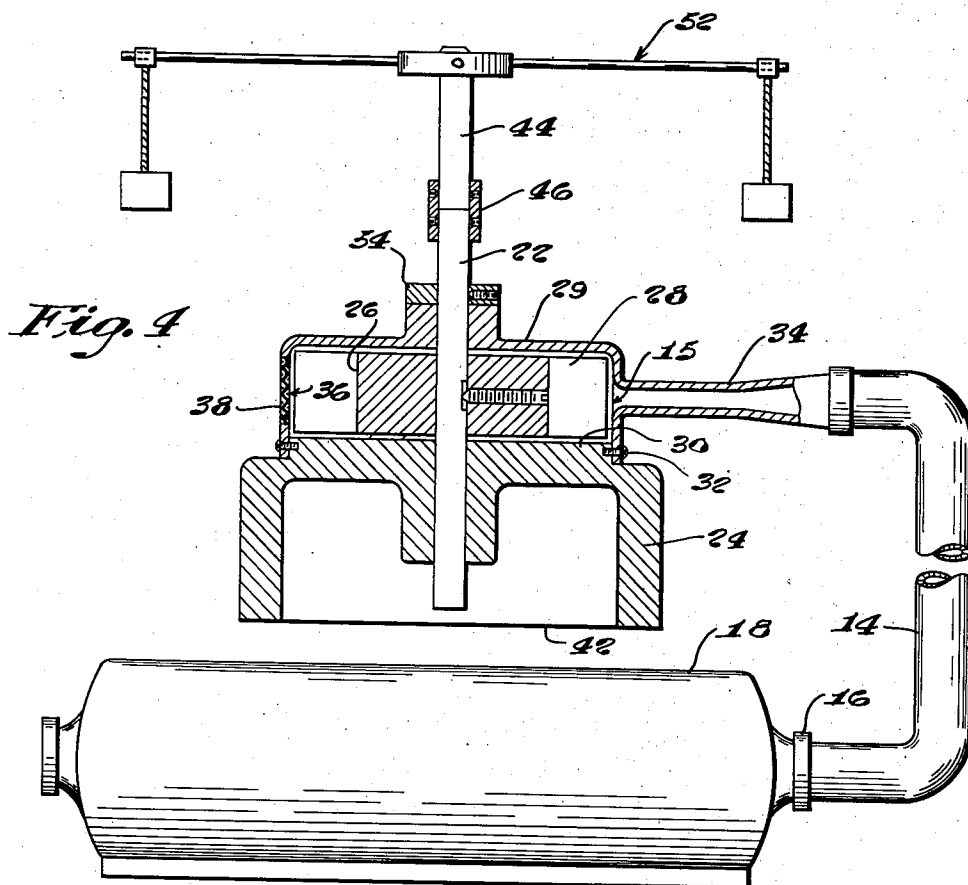
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PNEUMATICALLY DRIVEN POWER UNIT

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1 Claim. (Cl. 253—40)

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This invention relates to a pneumatically driven power unit.

The invention has for an object to provide a novel and improved pneumatically driven power unit for driving small power-driven toys, tools and the like, which is simple in construction, efficient in operation, and which is particularly adapted to receive its source of air from the exhaust end of a vacuum cleaner.

With this general object in view, and such others as may hereinafter appear, the invention consists in the pneumatically driven power unit and in the various structures, arrangements and combinations of parts hereinafter described, and particularly defined in the claim at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 illustrates the present power unit operatively connected to a rotating toy and having a flexible hose connection to the exhaust end of a vacuum cleaner; Fig. 2 is an enlarged cross sectional view in front elevation of the present power unit; Fig. 3 is a cross sectional view taken on the line 3—3 of Fig. 2; Fig. 4 illustrates the present power unit supported in a horizontally rotating position and connected to a different rotating toy; and Fig. 5 is a modified form of the invention illustrating the power unit directly attached to the operating shaft and frame of a rotating toy.

In general, the present invention contemplates a pneumatically driven power unit for small power driven toys, polishing or grinding tools and the like which is simple in construction, efficient in operation, and which may be used with maximum safety by children without the dangers inherent in electrically driven power units. In its preferred form the present power unit may and preferably will be provided with an inlet adapted for connection to a flexible hose leading from the exhaust end of a vacuum cleaner. In practice the hose connection may be extended a sufficient distance away from the power unit so that the vacuum cleaner may be placed in a position out of the control of the children to be attended by the person in charge.

Referring now to the drawings, and particularly to Fig. 1 as herein shown, 10 represents a pneumatically driven power unit operatively connected to a rotating toy 12 and having a flexible hose connection 14 leading from an inlet 15 of the air motor 10 to the exhaust end 16 of a household vacuum cleaner 18. As illustrated in detail in Figs. 2 and 3, the power unit comprises an air motor having a rotor indicated

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generally at 20 fast on a shaft 22 journaled in a base member 24. As herein shown, the rotor comprises a relatively large cylindrical hub member 26 having a plurality of vanes or curved blades 28 secured to the periphery thereof. In practice, the relatively large hub member 26 serves as a fly wheel or balance wheel to stabilize the rotation of the rotor.

As illustrated in Figs. 2 and 3 the rotor 20 operates in a chamber 21 formed by one face of the base member 24 and a cylindrical casing or housing 29 secured to a cylindrical extension 30 of the base member by screws 32. The casing 29 is provided with a pipe 34 extending from the inlet 15 for connection to the flexible hose 14 of the vacuum cleaner. As shown in Fig. 3, the pipe 34 extends at right angles to a vertical line passing through the center of the rotor and is disposed a short distance below a point of tangency with the outside diameter of the casing so as to direct the air to approximately the center of the vanes 28. The inlet pipe 34 may and preferably will be tapered as shown with the small end of the taper communicating with the inlet in order to effect an increase in the velocity of the air entering the chamber 21 for most efficient operation. The casing 29 is further provided with an exhaust opening 36 at the lower end thereof and the opening may and preferably will be provided with a screen wire covering 38 to protect the rotor and to safeguard the child operating the unit.

As illustrated in Figs. 1 and 3, the shaft 22 is provided with a power take off herein shown as a pulley 40 by which the unit may be belted to a rotary toy or other driven element, or, the power take off may comprise a gear or other driving element for connection to the driven element. The other end of the shaft 22 preferably terminates within a line 42 defining the outer right hand surface of the base viewing Fig. 3 for a purpose to be hereinafter described. When used in the manner illustrated in Fig. 3, the shaft 22 may be provided with an extension 44 connected thereto by a coupling 46 and a second wheel which may comprise a pulley or a rotary tool such as a polishing or grinding wheel indicated generally at 48 may be attached to the extended shaft 44.

The illustrated base member 24 may and preferably will be relatively heavy to serve as a rigid support for the power unit, or, the base may be clamped or attached in any usual or preferred manner to a table or other support when in use. As herein shown, the base 24 is designed

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to support the power unit in either an upright position as shown in Fig. 3 or in a horizontal position as shown in Fig. 4. The base is generally cylindrical in form being flat on one side to provide a surface 50 parallel to the shaft 22 for supporting the unit in an upright position. As illustrated in Fig. 4, the surface 42 of the base is likewise flat and arranged at right angles to the shaft 22 whereby the power unit may be supported in a horizontal position.

When the power unit 10 is mounted in a horizontal position, the shaft extension 44 and coupling 46 are removed and may be connected to the other end of the shaft 22 for supporting and operating a rotary toy indicated generally at 52 after removing the take off pulley 40 from this end. A collar 54 may and preferably will be provided on the shaft 22 adjacent the hub 56 of the casing 29.

Referring now to Fig. 5, as therein shown, the pneumatically operated power unit 10 is illustrated as directly connected to and forming a part of a rotary toy such as a Ferris wheel. In this embodiment the rotor 20 may be keyed to one end of the operating shaft 60 of the Ferris wheel and the casing 29 directly attached to the frame 62 thereof. In order to balance the unit, the other end of the shaft 60 may and preferably will be provided with a fly wheel 64 as shown.

From the above description it will be observed that the present pneumatically driven power unit is particularly adapted for connection to and operation by the exhaust air from a vacuum cleaner whereby to provide a simple and efficient unit which may be safely handled by children operating small power driven toys. It will also be observed that the present power unit is generally useful for driving rotary household tools such as polishing or grinding wheels. Another use contemplated is the provision of a fan on the operating shaft for cooling purposes. Although the vacuum cleaner illustrated comprises a cylindrical unit having a flexible hose to which the cleaning tools are attached, it will be understood that the present power unit may be driven by an exhaust connection to an upright type of vacuum cleaner or to a hand cleaner if desired. While the preferred embodiment of the invention contemplates a connection to the exhaust end of a vacuum cleaner, the present power unit may be operated by a connection to the suction end of the vacuum cleaner to effect a reverse rotation of the rotor.

Provision may also be made in the present power unit for controlling the air entering the inlet 15 and thus control the speed of the unit. As illustrated in Fig. 2, the inlet pipe 34 may be provided with a relief opening 66 having an adjustable cover 68 for permitting more or less air to escape from the inlet pipe during the operation of the unit.

While the preferred embodiment of the inven-

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tion has been herein illustrated and described it will be understood that the invention may be embodied in other forms within the scope of the following claim.

Having thus described the invention what is claimed is:

A pneumatic power unit, comprising: a hollow base member having a closed end and an open end, said closed end providing an outwardly disposed flat, planar surface and the boundaries of said open end defining a plane substantially parallel to said outwardly disposed flat planar surface, said base member having at least one additional flat planar surface between said closed end and said open end and being arranged substantially perpendicular to said plane defined by said boundaries of said open end of said base member; a hollow casing secured to said flat planar surface, said hollow casing having a tangential inlet and an outlet; a power take-off shaft journaled in said base member and in said casing and disposed substantially perpendicular to said flat, planar surface, with one end of said shaft extending outwardly beyond said casing and the other end of said shaft terminating between the open and closed ends of said hollow base member with said other end being exposed, whereby additional power take-off means may be removably secured thereto; a vaned rotor secured to said power take-off shaft within said casing; and means for supplying a moving stream of gas through said tangential inlet so as to impinge against the vanes of said rotor, the arrangement being such that said power unit may be operatively supported, as desired, on said open end of said hollow base member with said power take-off shaft in a substantially vertical position or on said additional flat planar surface with said power take-off shaft in a substantially horizontal position.

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