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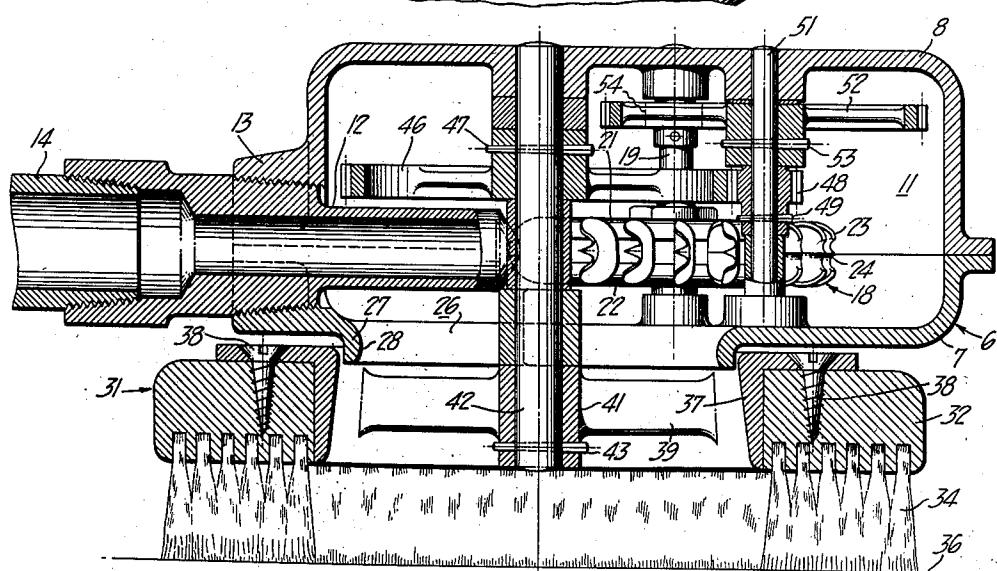
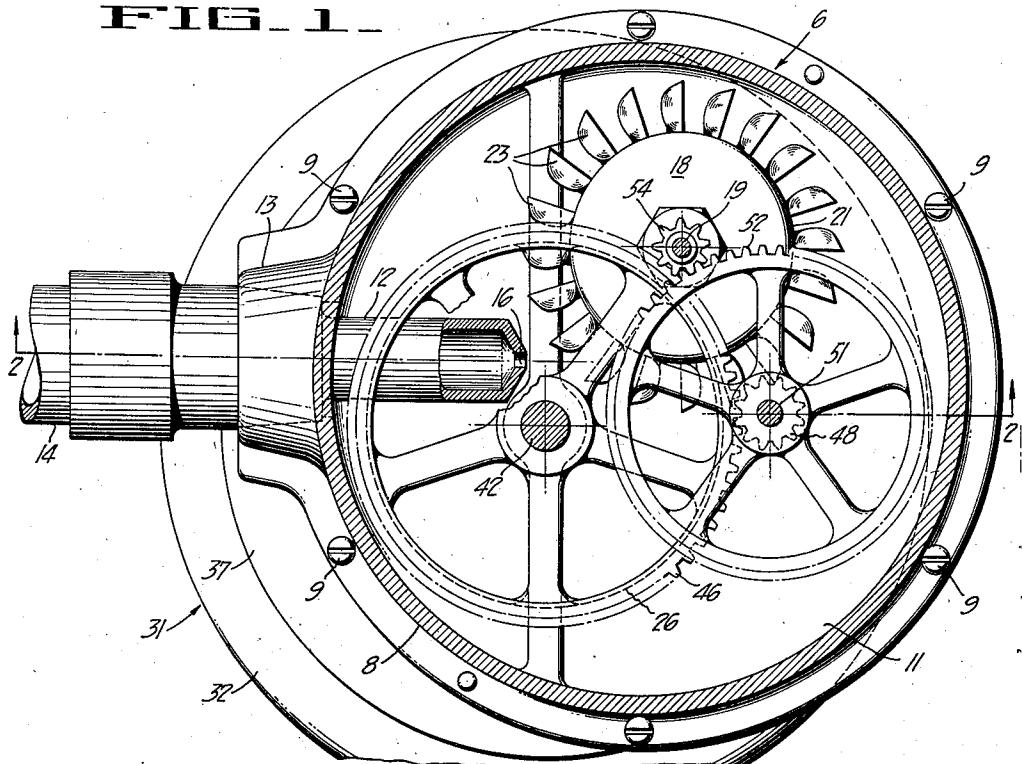
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2,540,240

WATER WHEEL DRIVEN BRUSH

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FIG. 1.



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FIG. 2.

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WATER WHEEL DRIVEN BRUSH

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3 Claims. (Cl. 15—29)

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My invention relates to means for converting the energy of fluid under pressure into mechanical work and is especially concerned with a means impelled by water for driving a tool such as a brush. More particularly the invention is concerned with a water wheel driven rotary brush especially useful in washing large windows or other surfaces in which not only a washing fluid, but a scrubbing action is necessary to secure the desired result.

It is an object of my invention to provide an improved power device.

Another object of the invention is to provide means for utilizing a pressure fluid both as a washing agent and as a driving agent.

An additional object of the invention is to provide a power device in which the actuating fluid is converted into a fine spray.

Another object of the invention is to provide means for assisting in conducting the spray to the point of use.

A further object of the invention is to provide an economical and effective power device especially for use with a brush.

Other objects together with the foregoing are attained in the embodiment of the invention illustrated in the accompanying drawings in which

Figure 1 is a plan of a power device constructed in accordance with my invention, the top portion of the casing being removed to disclose the interior construction.

Figure 2 is a cross section the planes of which are indicated by the line 2—2 of Figure 1.

In its preferred form the power device of my invention includes a casing having a lateral aperture therein, within which is installed a nozzle for discharging a fluid jet, such as a water jet, against a water wheel which is driven by the jet and is effective to convert the jet into a spray discharging from the casing through the lateral aperture. Encompassing the aperture is a tool such as an annular brush effective in connection with the spray to wash a surface and revolved by a suitable connection extending through the aperture to the water wheel.

While the power device of my invention can be embodied in a number of variant forms, it has been successfully embodied in the form shown in the accompanying drawings in which the design is especially adapted for use in washing windows or the like and is made of a general size and weight to be readily handled by a user. The structure includes a casing generally designated 6 having a base 7 and a cap 8 secured together by fastenings 9 and conjointly defining a cham-

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ber 11. Projecting into the chamber is a nozzle 12 secured in place by a threaded fitting 13 and having a connection 14 extending to any source of a suitable fluid such as water under pressure. 5 The interior end of the nozzle is provided with a jet aperture 16 so that when fluid under pressure is discharged from the nozzle, a high velocity jet of water issues therefrom. Preferably the contour of the casing 6 and also of the connection 14 is such that they are conveniently grasped by the hand of a user for portability of the structure and for mobility in use.

Disposed within the chamber 11, and arranged in a suitable location therein to intersect the jet issuing from the nozzle 16, is a water wheel generally designated 18. This water wheel is preferably of the Pelton type and comprises a central shaft 19 appropriately journaled at its opposite ends in the two casing portions 7 and 8.

10 On the shaft 19 is mounted a pair of facing discs 21 and 22 between them securing in position a plurality of individual buckets 23 arranged around the periphery of the discs and disposed with their splitter sections 24 coincident with the

15 median plane of the nozzle 16 and so that the axis of the nozzle is substantially tangent to the discs 21 and 22. With this arrangement, the jet issuing from the nozzle 16 loses most of its energy to the water wheel thereby rotating it and its shaft 19. Furthermore, the jet is broken up or converted into an extremely fine fog-like spray.

20 The quantity of fluid utilized with a water wheel of this type is sufficiently small and the energy transfer is such that the resultant spray fills substantially the entire interior of the chamber 11. 25 To rid the chamber of the resulting mist and to utilize the spray in the washing operation, the casing section 7 on one side is formed with a circular aperture 26 of considerable extent bounded by a flange 27 the interior surface 28 of which is 30 of an approximate Venturi contour. Encompassing the aperture 26 is a tool generally designated 31, in this instance a brush. The brush base 32 is an annulus co-axial with the aperture 26 and 35 contains a number of rows of bristles 34. These bristles are likewise in annular contour and define a plane surface 36 for contact with the surface to be cleaned by the unit.

To secure the tool, there is provided a flanged 40 rim 37 to which the brush is fastened by screws 38 and which in turn is integral with a spider 39 including a hub 41. A drive shaft 42 extends axially through the aperture 26 and is mounted in the casing 8. To it the hub 41 is secured by a

45 pin 43. The relationship of the rim 37 and the

50 hub 41 is such that the spider 39 is held in axial alignment with the drive shaft 42. The spider 39 is secured to the drive shaft 42 by a lock washer 44 and a lock nut 45. The drive shaft 42 is secured to the central shaft 19 by a lock washer 46 and a lock nut 47. The central shaft 19 is secured to the base 7 by a lock washer 48 and a lock nut 49.

flange 27 is such that because of the gradually diverging contour of the rim 37 and of the base 32, during rotation of the tool 32 an eduction or suction due to centrifugal force is exerted on the interior chamber 11. Thus there is a tendency due to rotation of the brush to withdraw from the interior of the housing the mist or spray which results from the operation of the water wheel.

In order to produce an appropriate rotation of the tool and to provide the spray-educting operation, the shaft 42 is on its side away from the aperture 26, and within the chamber 11 on the side of the nozzle and water wheel away from the aperture 26, provided with a master gear 46. This gear is secured to the shaft by a pin 47 and meshes with a pinion 48 also disposed on the same side of the nozzle and water wheel and itself secured by a pin 49 to a lay shaft 51 appropriately mounted in the portions 7 and 8 of the casing. Revolving with the pinion 48 is a spur gear 52 secured on the shaft by a pin 53 and in its turn meshing with a pinion 54 fast on the water wheel shaft 19. Through this gear train, which is lubricated by the mist or spray obtaining within the casing 11, the relatively high rotational speed of the water wheel is reduced to an appropriate speed of rotation of the tool or brush 32.

With this arrangement, when water pressure is supplied through the connection 14 and the implement is grasped in the hand of a user, the issuing jet of water is broken up into a very fine mist or spray, the water wheel is revolved and in turn rotates the brush 32 to assist in withdrawing the spray or mist from the casing and to distribute it centrifugally due to rotation of the brush onto and over the surface being cleaned. The water wheel is efficient enough and the gear reduction is effective enough to furnish the brush with sufficient power in relation to the water used that even though considerable pressure is exerted against the surface 36, the brush is still rotated fast enough to provide an effective cleansing action with the discharged spray.

I claim:

1. A power device comprising a casing having an aperture therein, a nozzle in said casing for discharging a water jet and disposed over said aperture, a divided bucket water wheel journaled in said casing partially over said opening in a position to be driven by said jet and to

divide said jet into two spray portions one of which discharges directly through said aperture, an annular brush journaled on said casing surrounding said aperture directly in the path of said one spray portion, and means extending through said aperture for connecting said water wheel to the brush to rotate said brush.

2. A power device comprising a casing having an aperture therein, a nozzle in said casing for discharging a water jet and disposed over said aperture, a divided bucket water wheel journaled in said casing partially over said opening in a position to intercept said jet adjacent the center of said aperture and to divide said jet into two spray portions one of which discharges directly through said aperture, and an annular brush journaled on said casing in a position directly to receive centrally said one spray portion from said intercepted jet.

3. A power device comprising a casing defining a chamber having an outlet aperture therein, a nozzle extending into said chamber and disposed over said aperture for discharging a water jet across said aperture, a divided bucket water wheel disposed within said chamber and extending over said aperture to intercept said jet and deflect water from said jet into two spray portions one of which travels directly through said aperture, an annular brush journaled on said casing surrounding said aperture and directly in the path of said one portion of water deflected by said water wheel, and means for connecting said water wheel to the brush to rotate said brush.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
661,277	Rix	Nov. 6, 1900
1,055,572	Thompson	Mar. 11, 1913
1,433,160	Shoemaker	Oct. 24, 1922

FOREIGN PATENTS

Number	Country	Date
18,935	Great Britain	1890
4,160	Great Britain	1912
345,861	Great Britain	Apr. 2, 1931