United States Patent [19]

Enters

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[54] **IMPELLER**

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[73] Assignee: **Gilson Bros. Co.**, Plymouth, Wis.

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[52] **U.S. Cl.** ....**37/43 R**, 37/43 E, 302/38, 416/236 A

[51] **Int. Cl.** **E01h 5/00**

[58] **Field of Search** ....37/43, 43 A–43 K, 37/53, 20–27, 189; 29/156.8 R, 156.8 B, 156.8 CF, 156.8 H; 416/193, 194, 195, 197, 202, 235, 236, 236 A; 302/37, 38

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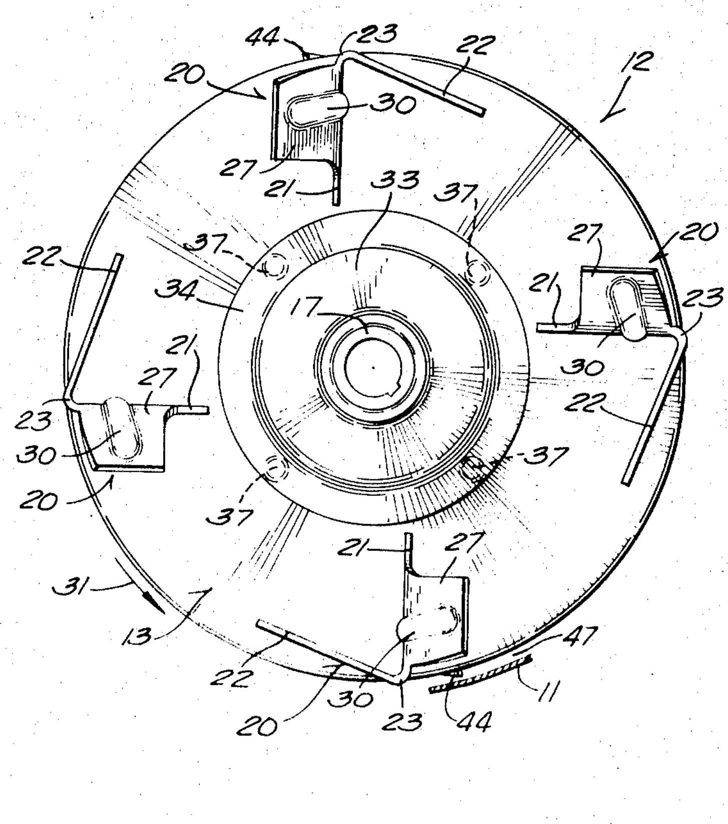
[57] **ABSTRACT**

A second stage impeller for a snow blower. The impeller parts are made of light gauge sheet metal. The impeller base rotor is stamped in a dome shape to increase its strength and has attached thereto sheet metal impeller flights, each of which comprises a paddle transverse to the path of impeller rotation and a bracing strut behind the paddle. The paddle desirably has a top portion curved forward in the direction of impeller rotation and a reenforcing rib embossed in the curved portion. The base rotor has an opening through which the impeller shaft hub extends. A sheet metal cap is superimposed over the base rotor and has a rim fastened to the face of the base rotor and has an apertured crown spaced from the base rotor and through which the shaft hub extends.

7 Claims, 5 Drawing Figures



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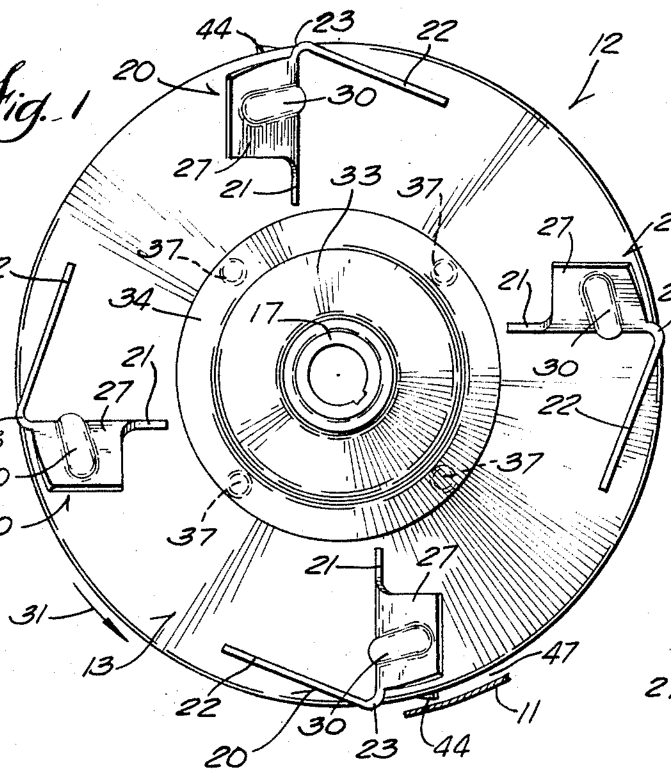

Fig. 1

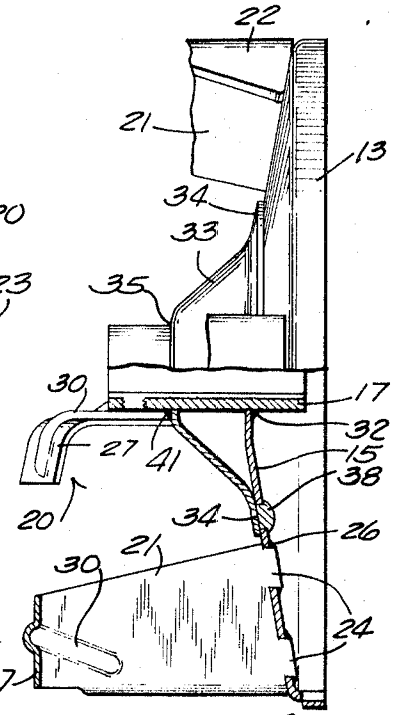

Fig. 2

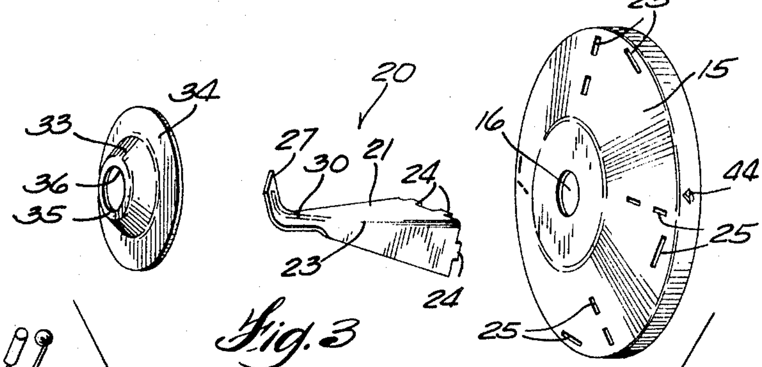

Fig. 3

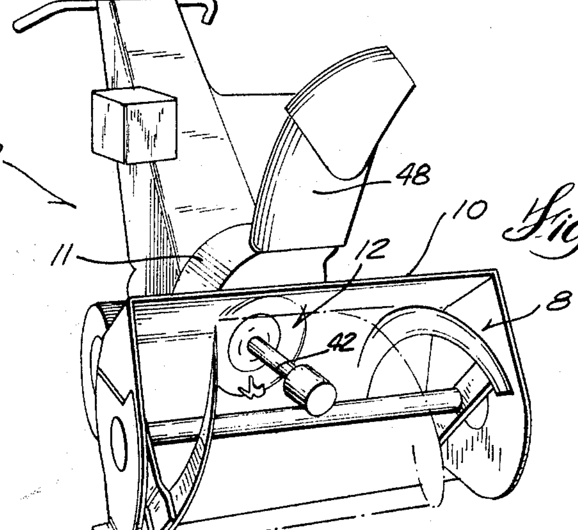

Fig. 4

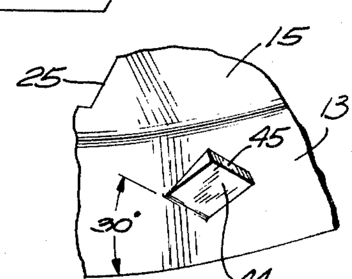

Fig. 5

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IMPELLER

BACKGROUND OF THE INVENTION

Heretofore, second stage impellers for snow throwers have been made by welding relatively heavy metal parts together. These parts were typically fabricated by rolling the parts from ten gauge sheet metal having a thickness of 0.1345 inches.

SUMMARY OF THE INVENTION

The present invention greatly reduces the weight of the second stage impeller by fabricating it out of light gauge sheet metal, typically fourteen gauge sheet metal which is 0.0747 inches thick. All of the parts are stamped for ease in fabrication, and the parts are concurrently shaped to increase their strength.

The impeller flights are stamped out of sheet metal and comprise paddles which face the direction of impeller rotation and bracing struts behind the flights. The upper portions of the paddles are curved forwardly and are provided with a reenforcing rib embossed therein. In one embodiment the paddles and struts are stamped out of one piece bent at an angle between the paddle and strut.

The impeller shaft hub passes through an opening in the base rotor and also through the apertured crown of a superimposed sheet metal dome-shaped cap which has a rim fastened to the base rotor. The apertured crown of the cap is spaced from the base rotor to provide a bracing bracket for the impeller shaft.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of an impeller embodying the invention.

FIG. 2 is a view partly in side elevation and partly in transverse cross section through the impeller of FIG. 1.

FIG. 3 is an exploded perspective view of the parts of the impeller.

FIG. 4 is a reduced scale fragmentary perspective view of a snow thrower in which the second stage impeller is incorporated.

FIG. 5 is an enlarged fragmentary perspective view of the base rotor, showing details of the snow wiping tooth.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Although the disclosure hereof is detailed and exact to enable those skilled in the art to practice the invention, the physical embodiments herein disclosed merely exemplify the invention which may be embodied in other specific structure. The scope of the invention is defined in the claims appended hereto.

FIG. 4 shows a snow thrower **9** for which the impeller is adapted. The snow thrower **9** has a ribbon flight auger housing **10** at the rear of which is mounted the second stage impeller housing **11.** The second stage impeller **12** is mounted in housing **11,** and receives snow advanced thereto by the ribbon flight auger **8.**

In accordance with the present invention, the impeller **12** comprises a base rotor **13** stamped out of light gauge sheet metal, preferably 14 gauge metal which is 0.0747 inches thick. The rotor comprises a rim **14,** a dome-shaped face **15,** the contour of which adds strength thereto, and an open back. The peak of the dome is flattened and is provided with a central opening **16** to receive a tubular hollow shaft or hub **17** by

which the impeller is driven from a drive shaft (not shown). In the illustrated embodiment the dome-shaped face **15** constitutes a frustum of a cone. However, other dome shapes, such as those generated by single curved, double curved and warped surfaces, the contour of which adds strength to the light gauge sheet metal, are also appropriate. The dome shape is a marked improvement on prior flat rotors which had to be made of heavier gauge metal to achieve requisite strength.

A series of snow impelling flights **20** are mounted on the dome-shaped face **15** of the base rotor **13.** Flights **20** are fabricated by stamping out of light gauge sheet metal, also preferably 14 gauge. Each flight **20** comprises a paddle **21** and a bracing strut **22.** Strut **22** is behind paddle **21** with respect to the direction **31** of rotation of rotor **12** and is at an angle thereto to support the paddle **21** as it impels snow. Desirably, both the paddle **21** and strut **22** are formed out of the same piece of metal and are interconnected on bend **23.**

The impeller flights **20** are confined to the peripheral zone of the base rotor **15.** The flights do not extend inwardly to the center of the rotor, thus leaving the center zone of the base rotor, as defined by the cap **33,** smooth and clear. Thus the impeller develops a better throwing action with reduced power consumption.

The bottom edges of the paddle **21** and strut **22** are provided with mounting lugs **24** which are received in complementary socket apertures **25** formed in the face **15** of the rotor **13.** Welds **26** desirably anchor the flight lugs **24** to the rotor face **15.** The provision for interlocking the lugs and sockets insures consistency in the accurate alignment of the flights on the rotor and also facilitates the welding process, inasmuch as the joint can be welded from the underside of the rotor, free from interference caused by the projecting flights.

Near their tops, the paddles **21** are curved forwardly at **27.** The curve is reenforced by a rib **30** embossed in the paddle and extending into the face of the paddle **21** and through the curved portion **27** thereof. The curve **27** is in the direction of rotation of the impeller, as indicated by arrow **31** in FIG. **1.**

The hollow shaft or hub **17** is welded at **32** to the aperture **16** in the rotor **13.** It is braced to the rotor by a 14 gauge stamped sheet metal cap **33** which is also dome-shaped, as shown in FIG. **3.** Cap **33** has a rim **34** and a flat crown **35** with an aperture **36** through which the hollow shaft **17** extends, as shown in FIG. **2.** The rim **34** is located over a series of weld openings **37** in the face **15** of the rotor, thus to receive welds **38** by which the cap **33** is secured to the rotor **13.**

In the illustrated embodiment dome-shaped cap **33** is conical, the cone angle for cap **33** being somewhat sharper than the cone angle for base rotor **13.** Accordingly, the crown **35** of cap **33** is spaced materially from the rotor face **15,** thus to provide a brace for the hollow shaft or hub **17** which is welded at **41** to the crown **35.**

The hollow shaft or hub **17** receives a drive shaft (not shown) from the gear case of the snow thrower engine and is also provided with a shaft extension **42** by which the ribbon auger **8** is driven.

The rim **14** of rotor **13** is desirably provided with outstruck wiper teeth **44** which rotate in proximity to the housing wall **11.** As best shown in FIG. **5** the wiper teeth **44** are desirably bent out of the flange **13** at about a 30° angle to the edge **46** of flange **13.** Thus, forward edge or face **45** of the tooth **44** is exposed at the same

30° angle. In one embodiment the projection of face **45** is in the range of 0.05–0.06 inches laterally from the side wall of flange **13**. Two or more such wiper teeth may be provided, as illustrated in FIG. **1**, and are positioned to rotate in the space or gap **47** between flange **13** and housing wall **11**.

Snow tending to flow through the gap **47** into the space behind the impeller **12** will be intercepted and picked up by the inclined faces **45** of the wiper teeth **44** and thrown ahead of the impeller and into the zone where the snow will be impelled by flights **20** through the discharge chute **48** of the snow thrower. Accordingly, the angled wiper teeth tend to prevent the snow from flowing through gap **47** in the first instance. The arrangement is greatly to be preferred over prior devices which allow the snow to flow into the space behind the impeller, where it tends to freeze up. Such wipers as are provided in such prior devices are faced with the problem of removing frozen snow which encrusts the space behind the impeller. By contrast, the angled wipers of the present invention tend to prevent the snow from flowing through gap **57** in the first instance, thus greatly reducing the formation of such encrustations.

While all of the parts of the second stage impeller are stamped out of light gauge metal, the unique configuration of these parts provides ample strength to the parts. The over-all result is a sturdy, less expensive, easy to assemble, consistent impeller construction which requires fewer parts than prior art impellers and is lighter in weight. The impeller of the present invention also affords a better impelling action. The novel wiper teeth have an improved snow excluding action to prevent snow from flowing into the space behind the impeller.

I claim:

1. An impeller comprising a sheet metal base rotor having a dome-shaped face with a center zone and a peripheral zone and sheet metal impeller flights confined to said peripheral zone to leave said center zone clear of flights, said flights being attached to said face in the peripheral zone of the rotor, said impeller flights each comprising a paddle transverse to the path of impeller rotation and a bracing strut behind the paddle, both said paddle and strut standing upright from said base rotor and being formed out of a single piece of sheet metal with a bend therebetween which forms a flight corner near the edge of the base rotor.

2. The impeller of claim **1** in which the paddles and struts of said flights have bottom edges provided with mounting lugs, the dome-shaped face of the rotor having mounting apertures receiving said lugs to expose said lugs at the undersurface of the rotor.

3. The impeller of claim **1** in which the flight paddles have top portions curved forward in the direction of impeller rotation, and a reenforcing rib embossed in said curved portion.

4. The impeller of claim **1** in which the base rotor and flights comprise light gauge sheet metal pieces.

5. The impeller of claim **1** in which said base rotor has a rim with wiping teeth.

6. The impeller of claim **5** in which the teeth are angled with respect to the direction of rotor rotation.

7. The impeller of claim **1** in combination with an impeller shaft hub, said base rotor having an opening through its center zone through which the shaft hub is received, and a dome-shaped sheet metal cap having a rim fastened to the center zone of the base rotor and an apertured crown spaced from the base rotor and through which said shaft hub extends.

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