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Enters et al.

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[54] **SNOW-HANDLING IMPLEMENT WITH BELT-DRIVEN IMPELLER AND COACTING LABYRINTHIAN BAFFLE**

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

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

[58] **Field of Search** 37/43, 53; 302/37, 302/38

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[57] **ABSTRACT**

To exemplify an implement to which the invention has particular application, we are showing herein a self-propelled snow thrower in which a propulsion shaft and thrower are driven by separate belts. The thrower impeller is encircled by an annular baffle structure with which it cooperates to exclude snow from the drive compartment without requiring a bearing or frictional contact seal for this purpose. Elimination of any solid wall between the impeller and drive compartments and elimination of any driving connection between the thrower impeller and the shaft which defines its axis of roation eliminates keys, set screws and the like and reduces fabrication costs.

13 Claims, 3 Drawing Figures

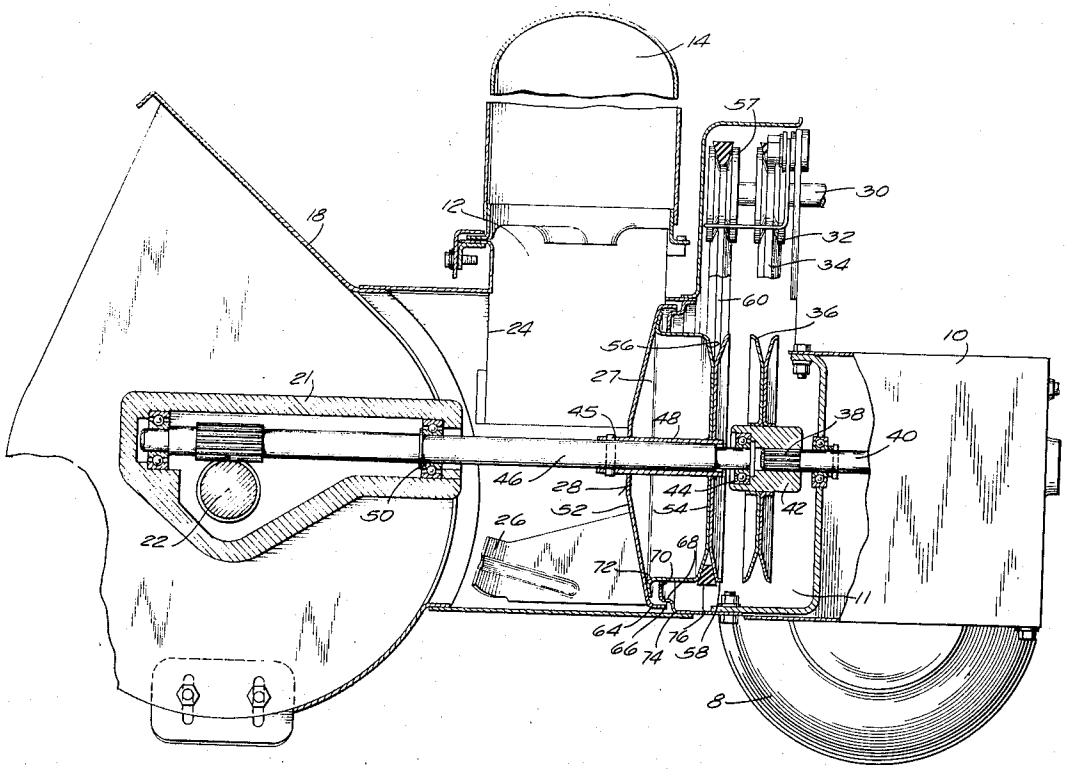

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Fig. 1

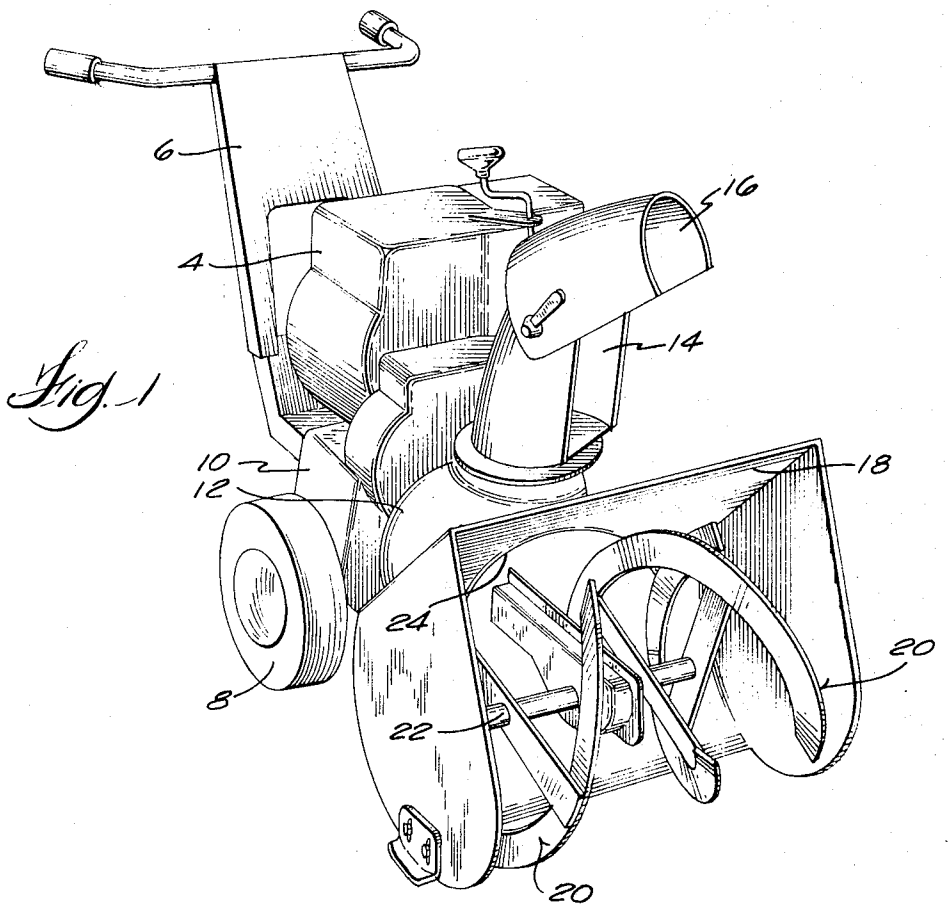
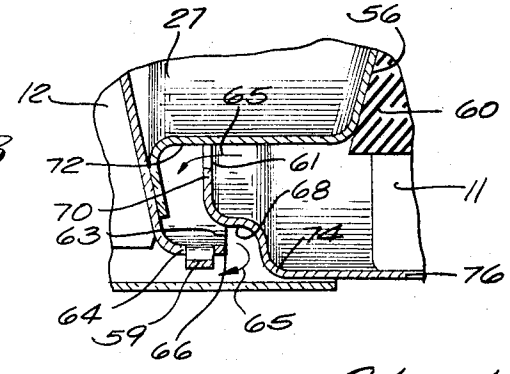


Fig. 3



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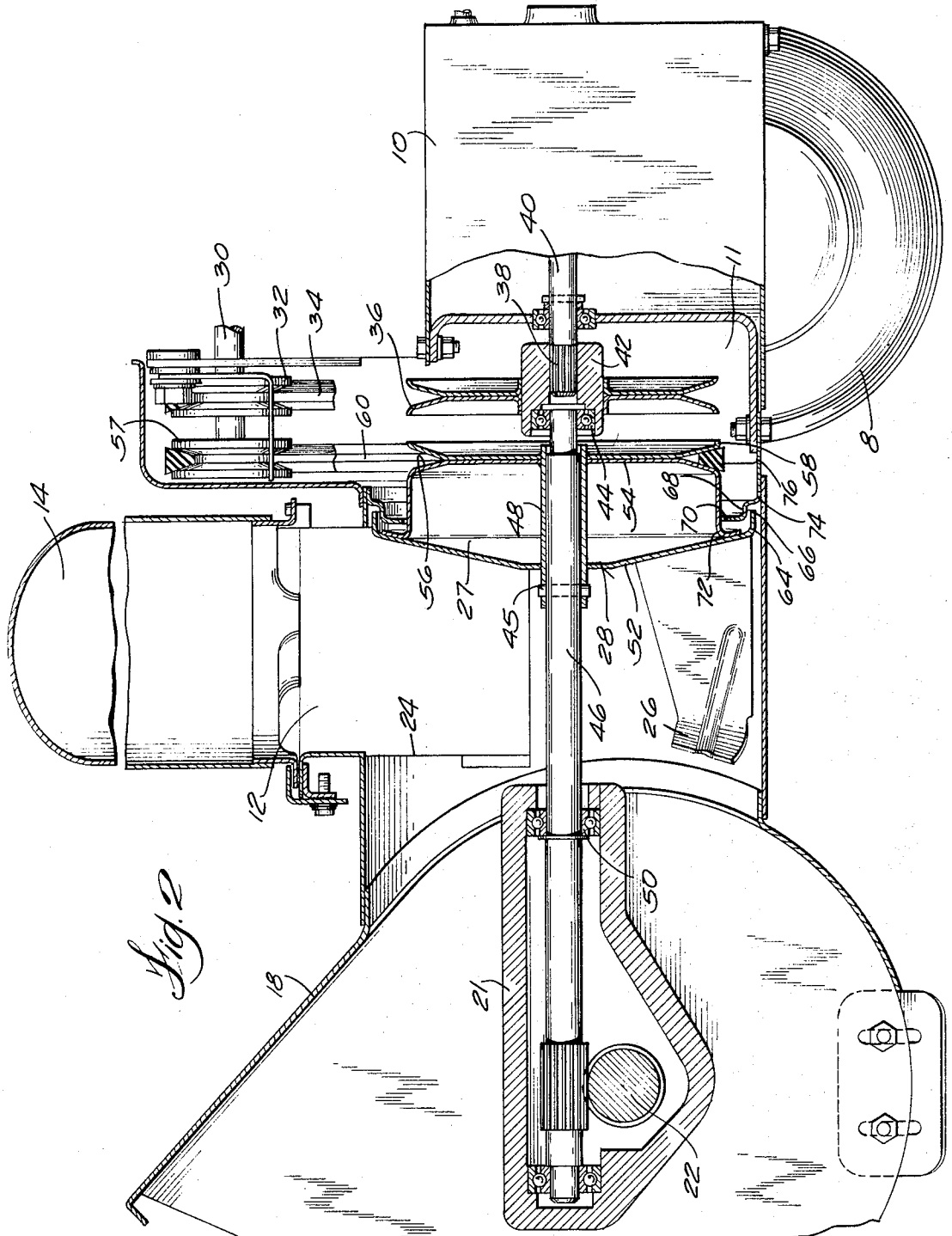

Fig. 2

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SNOW-HANDLING IMPLEMENT WITH BELT-DRIVEN IMPELLER AND COACTING LABYRINTHIAN BAFFLE

BACKGROUND OF THE INVENTION

It is deemed undesirable from an expense standpoint to provide a wall with penetrating shaft and bearing for excluding snow from the drive compartment of an implement of this type. Such has been the usual practice in the industry.

SUMMARY OF THE INVENTION

Although the traction wheel drive shaft and the rotary snow thrower impeller shaft are substantially coaxial and both driven directly from the same power shaft of the engine, the present invention contemplates that the driven pulley for the thrower impeller be a unitary part of the thrower impeller, thus eliminating from the thrower all mechanical connections with any shaft. Exclusion from the drive chamber of snow impelled by the throwing impeller is accomplished by an annular labyrinth baffle which comprises a ring carried by the snow thrower impeller and a stationary annular flange with which the ring coacts for centrifugal discharge of snow from the area about the impeller, thus eliminating mechanical driving connections and close tolerance clearances. The impeller rotor has blades mounted directly upon one of its faces, the other face including a pulley flange with which a disk with a complementary flange is unitarily connected to form a pulley. The drive through the pulley to the impeller is independent of the drive to the traction wheels. The impeller is driven directly at its periphery, without requiring any drive connection to its shaft.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic perspective view of a snow thrower exemplifying the invention.

FIG. 2 is an enlarged detail view in cross section along the axis of the propulsion shaft.

FIG. 3 is an enlarged cut away fragmentary sectional view showing details of the labyrinthian baffle.

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.

The snow thrower and most of the details are principally used herein merely for purposes of exemplification. The invention is not regarded as being limited to the specific structure illustrated.

In the implement shown, the engine **4** and guide handle **6** are connected with supporting and traction wheels at **8** upon which the traction wheel drive compartment **10** is likewise mounted. Ahead of compartment **10** is a belt drive compartment **11** and ahead of compartment **11** is a generally cylindrical impeller compartment or chanber **12** with adjustable chute **14** and deflector **16.** Attached to the front of chamber **12** is a shroud **18** partially enclosing the augers **20** which are mounted on shaft **22** driven from gear housing **21** and which serve to feed snow through the rear opening **24** of the shroud into the path of blades **26** which are part of the impeller **28.** These blades throw the snow up the chute **14** for discharge in a direction determined by the deflector **16.**

Power from the engine **4** is transmitted from the engine drive shaft **30** by means of pulley **32** and belt **34** to a driven pulley **36** in compartment **11** and splined at **38** to the shaft **40.** Shaft **40** drives the traction wheel **8.** The hub **42** of pulley **36** carries a bearing **44** wich is piloted on the shaft **46** to support a sleeve **48** which is fastened to shaft **46** by pin **45** and which provides a hub for the snow thrower impeller **28.** Another bearing **50** mounted on the gear case **21** supports the forward end of the shaft **46.**

In effect, the snow thrower impeller **28** comprises a hollow pulley or body **27** having a forward generally radially extending wall **52** and a rear wall **54,** the latter having a frusto-conical peripheral portion **56** coacting with an oppositely formed frusto-conical flange **58** to receive V-belt **60** reeved around pulley **57** mounted on the engine drive shaft **30** in axially spaced parallel relation to the drive pulley **32.** Projecting axially from the forward wall **52** of the hollow pulley **27** are several (two or three) snow-throwing arms **26** which have trajectories aligned with the chute **14** from which the snow is to be ejected.

Peripherally outside of the arms **26** the front wall **52** of pulley **27** is provided with an annular rearwardly turned flange **64** of substantially cylindrical outline. The margin **66** of flange **64** extends over shoulder **68** of a ring **70** which is a fixed part of the housing and encircles the periphery **72** of the hollow pulley **27.** It will be noted that the inner periphery of ring **70** extends substantially radially from the cylindrical portion **72** of the pulley. At shoulder **66** the ring **70** turns rearwardly and thence outwardly again at **74** to its supporting sleeve portions **76** (FIG. **2**).

As best shown in FIG. **3,** the flange **64** of the impeller body **27** is provided with small wiper blades **59** spaced widely about the periphery of the flange **64.** These blades keep the zone about the impeller free of ice. The blades **59** and friction of the rotating impeller on air and snow induce impact and centrifugal forces on the air and snow which prevent snow from moving from the impeller compartment **12** toward and into the belt drive compartment **11.**

The aforedescribed structure also affords an air inlet opening **61** and air outlet opening **63** (FIG. **3**) for flow of air in the direction of arrows **65** centrifugally induced by rotation of the impeller. This air flow also serves to exclude movement of snow from the impeller compartment **12** into the belt drive compartment **11.** Moreover, inasmuch as air and snow are being thrown out of the chute **14,** the impeller compartment **12** tends to be at a somewhat reduced pressure. This also helps induce air flow in the direction of arrows **65.**

The impeller body **27** has sufficient axial thickness (because it is hollow) to provide clearance around its periphery for the labyrinthian baffle path provided by the flanges **64, 66, 68** and **70.** This is so effective in excluding snow from the belt drive compartment **11** that the usual bearing partition is completely eliminated. The rotor **28,** instead of being driven by a shaft, is directly belt-driven independently of any shaft, thus eliminating considerable expense in manufacture.

Snow entering the shroud **18** and being advanced by the screws **20** to the impeller **28** for discharge will almost entirely be ejected through the impeller housing

12 and chute 14 without penetrating the belt drive compartment 11. The labyrinthian baffle is very effective in excluding snow from the drive mechanism. A major factor in making this possible is the impeller-pulley combination and its relation to the baffle ring.

We claim:

1. A snow-handling implement comprising a rotatable part, means for mounting said part for rotating on a predetermined axis, said part having snow-throwing blades projecting to rotate about the axis on which the part rotates, and means engaging the periphery of such part for effecting rotation of said part and blades, a labyrinthian baffle comprising a first flange encircling said part, said part having a lapping flange coacting therewith.

2. An implement according to claim 1 in which said first flange is stationary and has an annular shoulder across which a marginal portion of said lapping flange projects.

3. An implement according to claim 2 in which said part has a broad face terminating in a groove and provided in offset relation to the groove with said lapping flange which extends from said face radially and then axially, said first flange having a fixed mounting and provided with an axial shoulder across which said lapping flange extends.

4. A snow-throwing implement comprising the combination with means providing a drive compartment and an impeller compartment having discharge means comprising a chute, a first shaft in the drive compartment, a second shaft extending into the impeller compartment, an impeller mounted on the second shaft and free to rotate with respect to the first shaft, said impeller being disposed partly in the impeller compartment and having a groove in the drive compartment, snow-propelling blade means on the impeller in the impeller compartment, and a labyrinthian baffle between said compartments and comprising a relatively stationary annular flange encircling the impeller between said compartments and provided with an axial offset shoulder, and a baffle ring mounted on the impeller and having a peripheral marginal portion extending axially in lapping relation to the shoulder, a belt wholly disposed in the drive compartment and engaged in said groove, and means for actuating the belt.

5. A snow-throwing implement comprising the combination with means providing in series a screw feed compartment, an impeller compartment, a belt drive compartment and a traction drive compartment, coaxial shafts leading from said belt drive compartment in opposite directions, one of said shafts having a bearing at one side of the belt drive compartment and the other spanning the impeller compartment and leading to the screw feed compartment, a pair of driven pulleys mounted upon proximate ends of the respective shafts, driving pulleys haivng belts leading to the individual driven pulleys, the impeller compartment having a wall encircling the driven pulley which is on the shaft spanning the impeller compartment, said last mentioned pulley having a wall portion having a peripheral flange adjacent a flange with which the wall of the impeller compartment is provided and which encircles the last mentioned pulley.

6. An implement according to claim 5 in which the shaft spanning the impeller compartment is piloted on the said one shaft.

7. An implement according to claim 5 in which said pulley wall portion flange and impeller compartment wall flange comprise a rotary baffle, the said pulley on the shaft spanning the impeller compartment being primarily in the belt drive compartment and having vanes axially projecting from it in said impeller compartment and constituting said impeller.

8. In a snow thrower having a drive compartment, an impeller compartment, an impeller in said impeller compartment and drive means therefor in the drive compartment, the improvement for excluding transfer of snow from the impeller compartment to the drive compartment which comprises a baffle ring between said compartments, said impeller having a portion adjacent said ring, said ring and said impeller portion defining a labyrinth which centrifugally excludes snow from moving from the impeller compartment to the drive compartment when the impeller is rotated with respect to said ring.

9. An improvement according to claim 8 in which said baffle ring has an opening, said impeller having a body within said opening but spaced slightly from the baffle ring, said ring having a shoulder spaced outwardly from said opening, said impeller having a flange in outwardly spaced relation to said shoulder.

10. The improvement according to claim 9 in which the space between the impeller body and ring comprises an inlet and the space between the flange and shoulder comprises an outlet for air centrifugally tending by rotation of the impeller to flow from the drive compartment into the impeller compartment.

11. An improvement according to claim 9 in which said impeller body comprises a hollow drum with a substantially cylindrical wall within the ring opening, said drum having an end wall with peripheral margin turned to constitute said flange.

12. An improvement according to claim 11 in which said end wall has impeller blades extending therefrom into the impeller compartment.

13. An improvement according to claim 9 in which the impeller has a drive pulley in the drive compartment.

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