July 14, 1964 J. J. PETLAK ETAL 3,140,708

SNOW AND ICE MELTER

Filed May 31, 1962 3 Sheets-Sheet 1

FIG. 1.

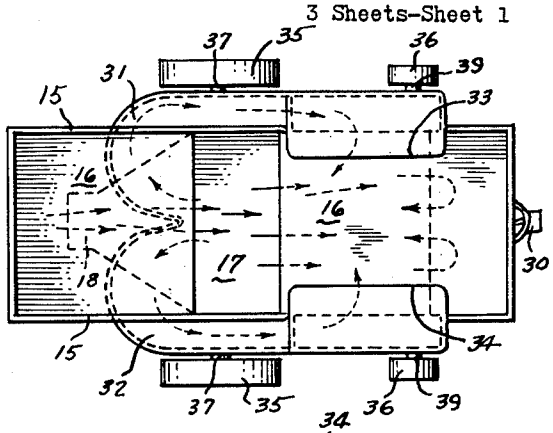
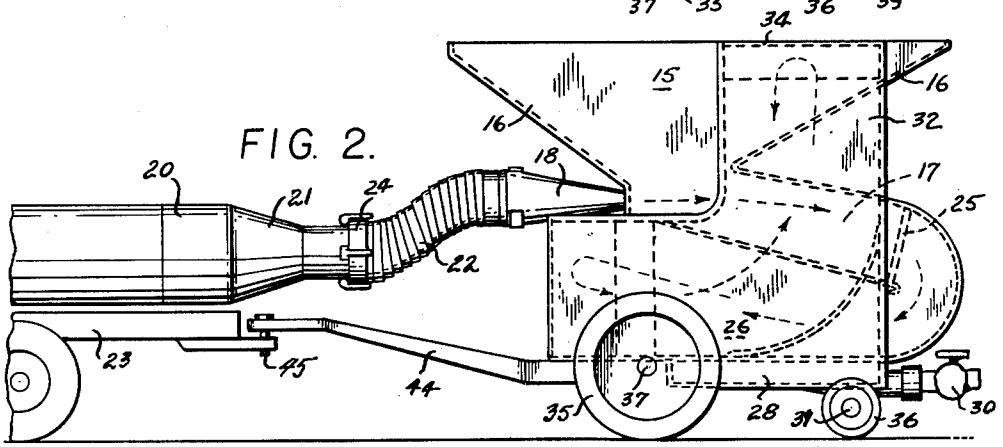


FIG. 2.



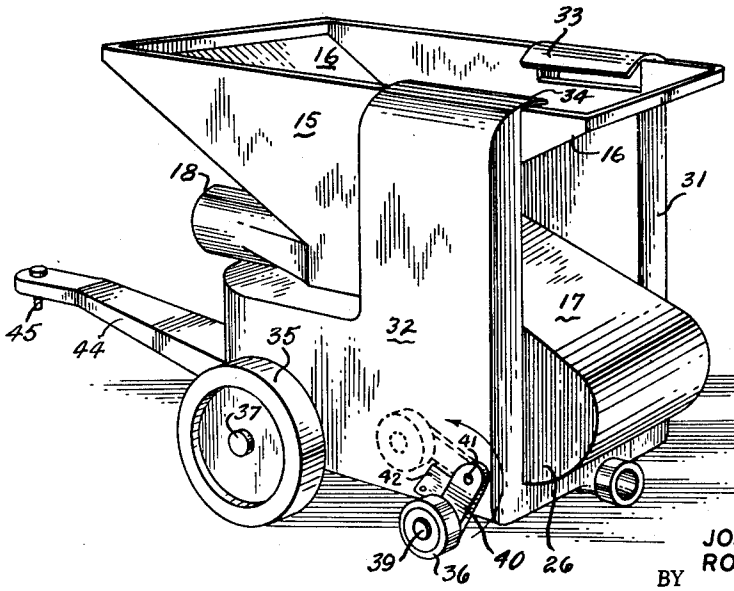


FIG. 3.

INVENTORS
JOSEPH J. PETLAK &
ROBERT REICHHELM

BY L. S. Salisbury
ATTORNEY.

July 14, 1964 J. J. PETLAK ETAL 3,140,708

SNOW AND ICE MELTER

Filed May 31, 1962 3 Sheets-Sheet 2

FIG. 4.

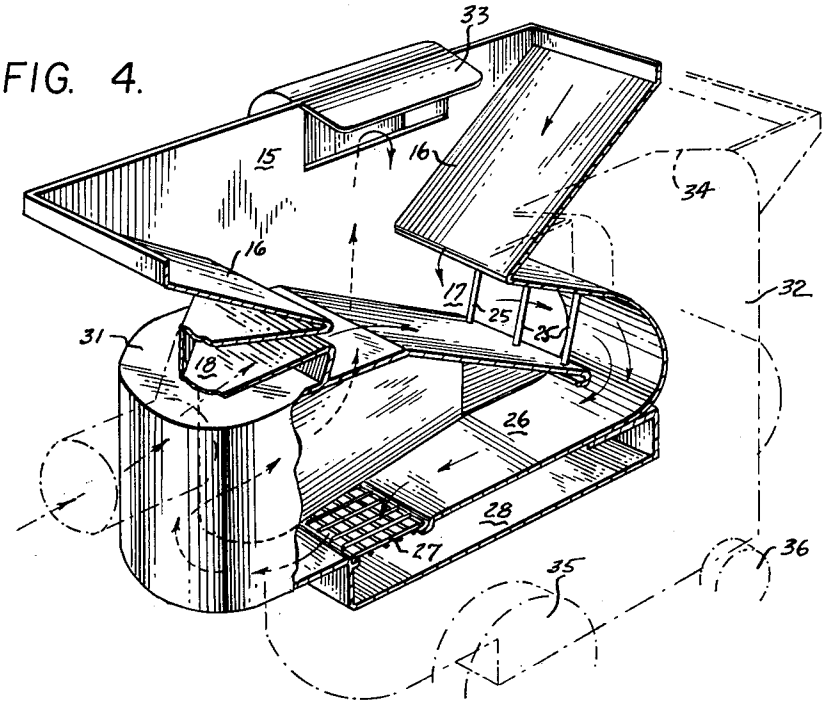
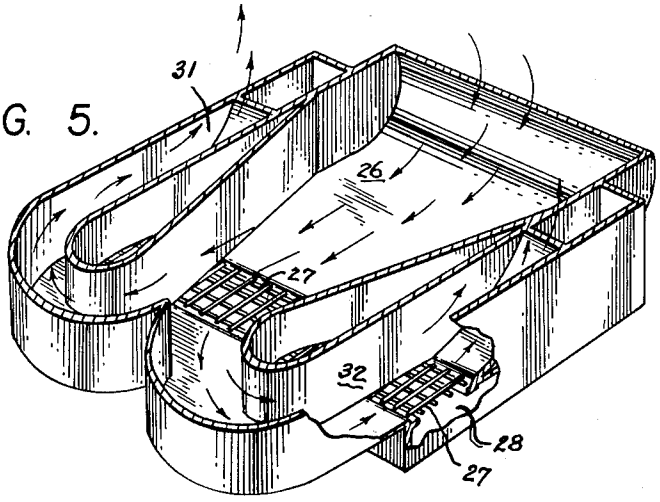


FIG. 5.



INVENTORS
JOSEPH J. PETLAK &
ROBERT REICHHELM

BY

L. S. Saulsbury

ATTORNEY.

July 14, 1964 J. J. PETLAK ETAL 3,140,708

SNOW AND ICE MELTER

Filed May 31, 1962 3 Sheets-Sheet 3

Fig. 6.

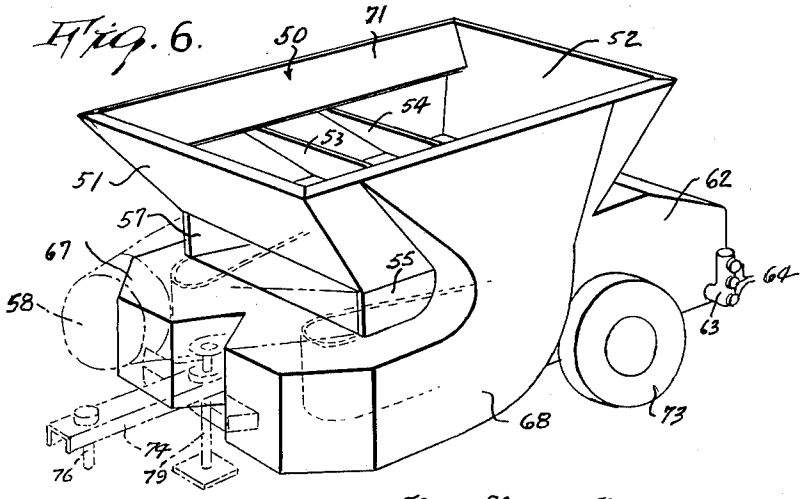


Fig. 7.

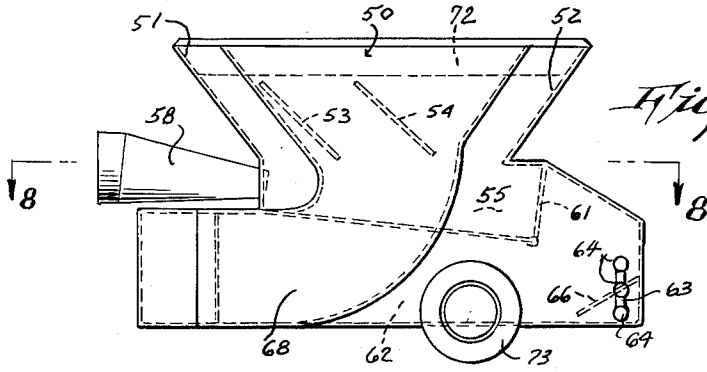


Fig. 9.

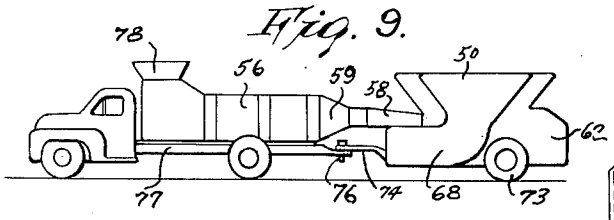


Fig. 8.

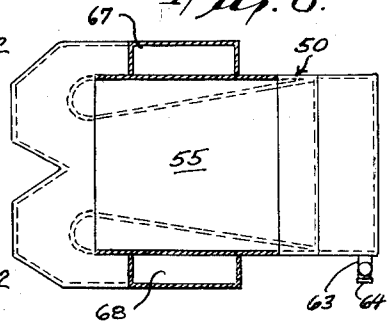


Fig. 10.

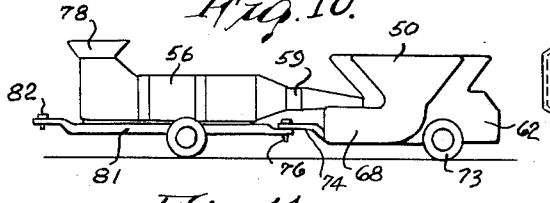
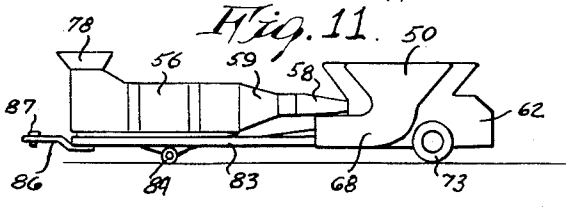


Fig. 11.



INVENTOR.
JOSEPH J. PETLAK &
ROBERT REICHHELM
BY
L. S. Saulsbury
ATTORNEY

United States Patent Office 3,140,708 Patented July 14, 1964

3,140,708

SNOW AND ICE MELTER

Joseph J. Petlak and Robert Reichhelm, both % The Bristol Sheet Metal Co., Wallingford, Conn.

Filed May 31, 1962, Ser. No. 199,094
2 Claims. (Cl. 126—343.5)

This invention relates to a mobile ducted snow and ice melter adapted to utilize the extremely hot exhaust gases of an aircraft type jet engine to melt snow and ice.

It is the principal object of the present invention to provide a ducted hopper structure into which snow and ice may be loaded by a bucket conveyor or other loading means that can be connected to the exhaust duct of an aircraft type jet engine so that the heat and velocity of these hot exhaust gases may impinge upon and melt the snow into water and be collected and drained off from the base of the hopper.

It is another object of the invention to provide a snow and ice melter having recirculating duct path whereby the exhaust gases after their initial erosive impingement on the snow and ice at the base of the hopper structure are led through a bifurcated path first upward to the top of the hopper and then deflected inward and downward onto the topmost snow and ice to cause a melting blast downward of the hot gases thereagainst and to effect a substantially complete utilization of the heat therefrom.

It is still another object of the invention to provide a mobile hopper structure capable of attachment to the exhaust duct of a jet engine mounted on a vehicle and by which the vechicle or any other vehicle bearing the hopper structure may be pulled or moved from one location to another.

It is still another object of the invention to provide a snow melting hopper with a sump for the water resulting from the melted snow and ice that serve as means for regulating through varying the water level therein to adjust the pneumatic constriction or resistance of the gas duct system to the applied jet exhaust gases for their optimum melting effect.

It is a further object of the invention to provide various ways of transporting the snow melter with the jet engine.

For other objects and a clearer understanding of the invention, reference may be had to the following detailed specifications taken in conjunction with the appended drawings, in which

FIGURE 1 is a top plan view of the preferred embodiment of the subject snow and ice melter,

FIG. 2 is a side elevational view of the snow melter and of the jet engine and mobile platform therefor,

FIG. 3 is a perspective view of the snow melter of FIGS. 1 and 2,

FIG. 4 is a broken top perspective view showing the junction of the snow hopper with the inlet duct and the ducts and chambers leading therefrom,

FIG. 5 is a broken perspective view showing the sump and two recirculating or reflex ducts,

FIG. 6 is a top perspective view of another embodiment of the invention in which the overall height of the snow melter has been reduced and the shape of the parts slightly changed,

FIG. 7 is a side elevational view of the embodiment of FIG. 6,

FIG. 8 is a horizontal sectional view taken on line 8—8 of FIG. 7,

FIG. 9 is an elevational view of this snow melter and of a truck to which it is hitched to be pulled thereby and the jet engine carried on the truck platform and connected to the melter to deliver its exhaust gases thereto,

FIG. 10 is an elevational view of the snow melter being towed by a trailer platform which carries the jet engine and which in turn is towed by a truck or tractor, and

FIG. 11 is an elevational view of a combined snow melter and jet engine with common support wheels.

Referring now particularly to the drawing, 15 is a hopper having opposingly downwardly-inclined surfaces 16, 16 which terminate in and connect to a melting duct 17. The junction of the hopper 15 and the melting duct 17 are joined at a bottom location into which an inlet duct 18 leads to discharge exhaust gases and to melt the snow or ice body from the bottom of the hopper.

An aircraft type jet engine 20 is provided with a rigid coaxial exhaust duct 21 whose exhaust gases are conducted to the discharge nozzle 18 by means of the flexible ducting 22. Jet engine 20 is mounted on and secured to a mobile platform 23 and ring clamps 24 secure the ducts 21 and 22 together.

It may be seen that the location and shape of inlet duct 18 is such as to direct high velocity, high temperature gases originating in the jet engine 20 into a path which is tangential to the path of snow or ice descending through the hopper 15, and which is also parallel to the axis of melting duct 17. Consequently, while the snow and ice is being forcibly blown and carried down duct 17, it has a maximum exposure to the heat of the jet engine exhaust gases and therefore undergoes rapid and efficient melting.

A set of ice-breaking bars 25 is provided spanning the exit aperture of duct 17 to provide a grid to limit the movement of the snow and ice. These bars guarantee that the snow and ice masses must be melted down to a predetermined size before being released from the melting duct 17. The exhaust gases emerging from the melting duct 17 pass into a separation chamber 26 where the water resultant from the melted ice and snow is separated from the continuing exhaust gases. This water passes through a bottom screen 27, FIGS. 4 and 5, into a sump chamber 28 which is provided with a drain valve 30, FIGS. 1, 2 and 3.

The exhaust gases emerging from duct 17 and passing through chamber 26 are then split into two streams by entering two symmetrical recirculating or reflex ducts 31 and 32. These latter ducts pass respectively upwardly on opposite sides of the hopper 15 until they respectively terminate in the curved deflecting vanes 33 and 34 overlying the snow and ice mass in the hopper. The latter vanes are designed to direct the exhaust gases downwardly onto the top of the load of snow and ice which has been loaded into hopper 15 so as to fully utilize the heat content of the exhaust gases for melting purposes.

All of the ducts and chambers 15, 17, 26, 28, 31 and 32 are secured together to form a unitary chassis which is given mobility by the provision of main wheels 35 and auxiliary wheels 36 are mounted on retractible links 40 which are pivoted on studs 41, secured to the walls of ducts 31 and 32, so that they can be folded against stops 42 into the dotted position shown in FIG. 3 when the snow disposal unit is being towed. A towing bar 44 secured to the snow disposal unit is provided so that it may be coupled to a towing truck or vehicle by a pin 45.

In operation, the hopper 15 of this invention is loaded with snow or ice by a bucket conveyor, power shovel, or any other suitable loading means. The jet engine 20 is then started and its hot exhaust gases are conducted by means of ducts 21, 22, and 18 to impinge the base of the snow mass in hopper 15. As this load is melted and carried down duct 17 it emerges past the icebreaking bars 25 into separation chamber 26 where the resultant water enters sump 28 and drains at an adjustable rate through valve 30. The continuing hot exhaust gases then pass upwardly through reflux ducts 31 and 32 and are deflected by vanes 33 and 34 downward upon the top of the snow and ice mass to further assist in the melting of the snow load in hopper 15.

If desired, the drain valve 30 may be partially closed so as to allow the water level to rise in chambers 28 and 26 so as partially to obstruct the passage of the exhaust gases through chamber 26. The resulting back pressure in duct 17 can be thus adjusted by the water level to the optimum value for the efficient melting of the snow load in hopper 15.

Referring now particularly to the embodiment of the invention shown in FIGS. 6, 7 and 8, 50 represents a hopper having opposingly downwardly-inclined end surfaces 51 and 52 and two parallel downwardly and rearwardly-inclined intermediate spaced baffle plates 53 and 54 for directing the snow and ice of the hopper downwardly and toward the rear of the hopper 50 into a horizontal melting duct 55 at the bottom of the hopper. Hot exhaust gases of a jet engine 56, FIGS. 9, 10 and 11 are delivered to the melting duct 55 through a forward end opening 57 adapted to detachably receive a spread nozzle 58 on the jet engine. The nozzle 58 is fixed rigid to engine exhaust spout 59.

The snow and ice are melted by the hot gases and the mass is driven against vertically-extending ice-breaking grid bars 61 spanning the exit end of the horizontal melting duct 55 to limit the movement of the ice and ensure that it is melted down to a predetermined size before being released to a combined bottom separation and sump chamber 62 of the gases and water and the water is collected therein to a predetermined height. A drain stand pipe 63 is connected to the bottom of the separation and sump chamber 62 and has vertically-spaced outlet plugs 64 any one of which may be released to drain the water to a predetermined level. To protect the drain outlet from a collection of ice that would hinder the drainage, an inclined baffle 66 is located in the rear of the separation chamber 62 over the drain outlet 63. The hot gases are divided into two streams through reflex ducts 67 and 68 that extend upwardly over opposite sides of the hopper 50 to deflect the gases inwardly over the top of the snow and ice mass respectively from under longitudinally-extending respective deflecting shield 71 and 72.

The snow disposal unit hopper 50 is supported on wheels 73 journaled to the rear of the gas separation and sump chamber 62. A hitch bar 74 extends forwardly from the hopper 50 and can be connected by a hitch pin 76 to a truck vehicle 77 that supports the jet engine 56 and its air intake chamber 78, FIGS. 6 and 9. When the snow disposal unit is detached from the truck 77 it may be supported at its forward end upon a stand 79.

In FIG. 10, the jet engine 56 is supported upon a trailer platform 81 and the snow disposal unit is connected to it by the hitch pin 76. The trailer platform 81 may be hitched in turn to a truck or tractor by its hitch pin 82.

In FIG. 11, the jet engine 56 is combined with the disposal hopper 50 and is supported upon a forwardly-extended hitch bar 83 that has wheel supports 84 and a hitch bar 86 and pin 87. The snow hopper 50 is loaded with snow by the snow conveying equipment and is then discharged in the form of water. The height of the water left in the sump chamber 62 serves to adjust the back pressure of the hot gases in the melting duct 55.

It is apparent that an efficient and effective snow melter has been provided and that a complete conversion of snow and ice into water can be effected by the utilization of the hot exhaust gases of a jet engine.

While various changes may be made in the detailed construction, it shall be understood tha such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

What is claimed is:

1. A snow and ice melter, in combination with a jet engine, comprising a hopper tapering downwardly and inwardly and having an open top for the inlet of snow and ice, a melting duct below the hopper and communicating with the bottom thereof, said hopper having an inlet opening above the duct, a nozzle in said inlet opening and extending outwardly thereof, a flexible duct having one end connected to the outer end of the nozzle, the other end of the flexible duct connected to the exhaust gas outlet of the jet engine, said hopper having reflex ducts on the sides of the melting duct communicating with said melting duct and leading to the interior of the hopper at the top thereof, a water sump chamber below said ducts, ice breaking bars in said melting duct in the path of movement of the ice and snow, the floor of said ducts constituting the roof of the sump chamber, and a screen in said floor.

2. Apparatus as defined in claim 1 characterized by curved vanes in the hopper at the top of the reflex ducts for deflecting the exhaust gases into the hopper, and drain valve means connected to the sump chamber to drain the resultant water therefrom and to control the water level therein.

References Cited in the file of this patent

UNITED STATES PATENTS

557,163	Springfels	Mar. 31, 1896
610,180	Greenig	Sept. 6, 1898
1,125,732	Savonius	Jan. 19, 1915
1,742,968	Polak	Jan. 7, 1930
1,806,069	Lloyd	May 19, 1931
2,845,058	Wadsworth	July 29, 1958
2,977,955	Altenburg	Apr. 4, 1961
3,011,493	Zieba	Dec. 5, 1961