

[54] SNOWMOBILE EXHAUST ARRANGEMENT

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[57] ABSTRACT

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A snowmobile is provided at a lower front portion with a well defined by a main front plate projecting downward from the front end of the top plate of an inverted channel shaped main frame, a forwardly progressively elevated front bottom plate having a rear end connected with the lower end of the main front panel and a pair of front side plates extending lengthwise of the main frame, the lower edge of each of the front side plates being connected with the front bottom plate, wherein an exhaust silencer for silencing the noises caused by exhaust gases from an internal combustion engine mounted on the main frame is disposed in the well.

[30] Foreign Application Priority Data

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[58] Field of Search..... 180/5 R, 54 A, 64 A;
181/35 B

[56] References Cited

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3 Claims, 4 Drawing Figures

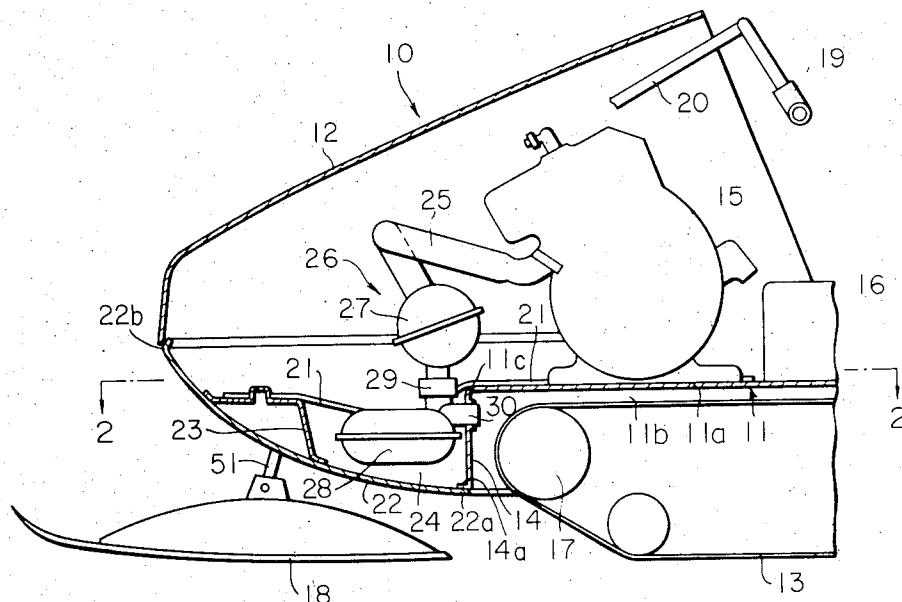


FIG. 1

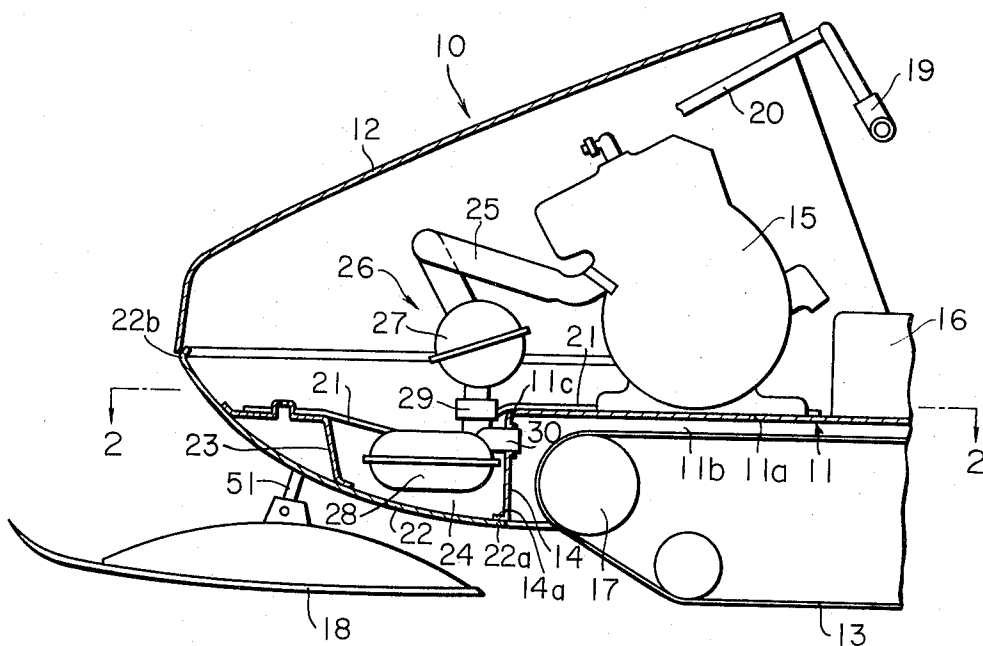


FIG. 2

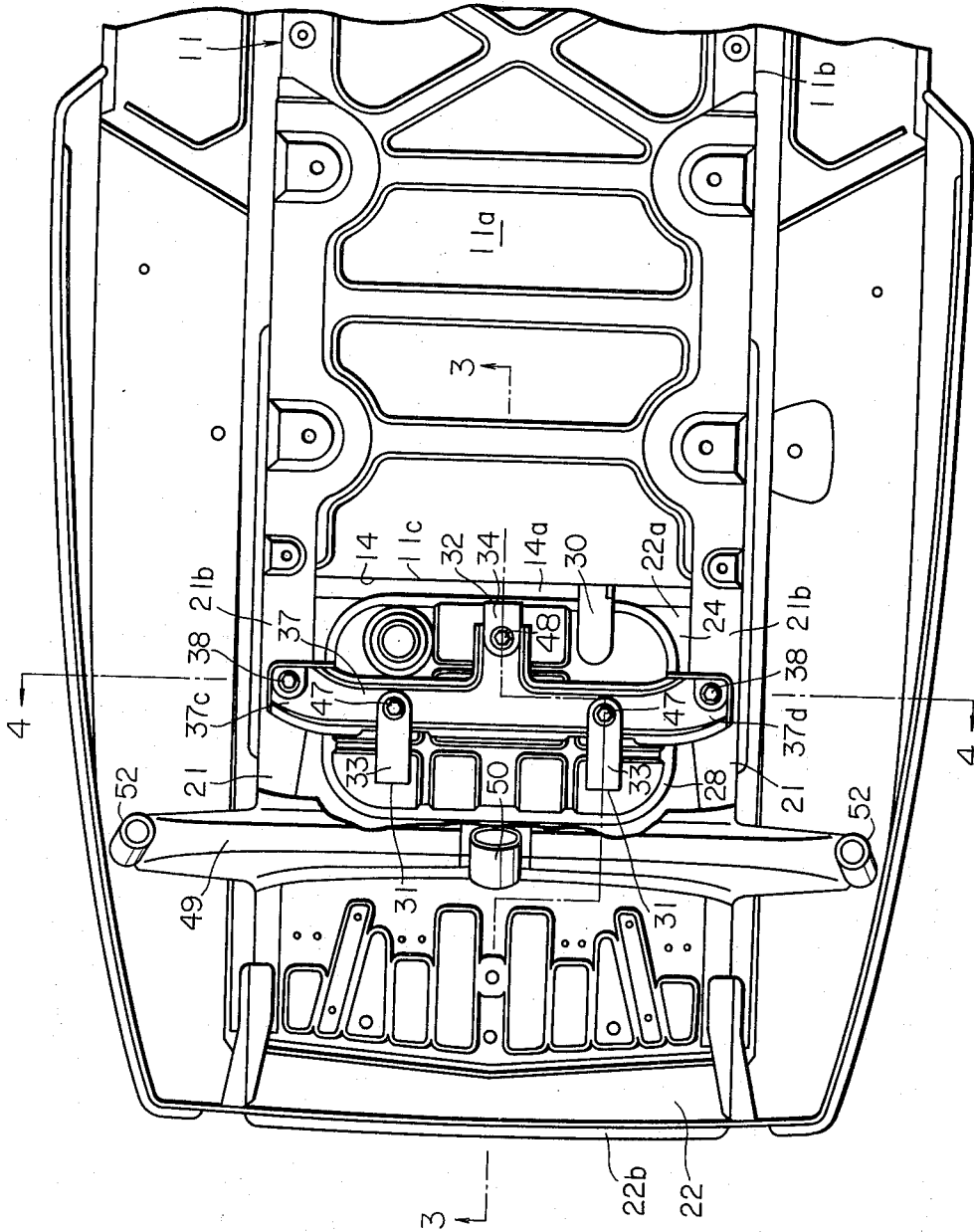


FIG. 3

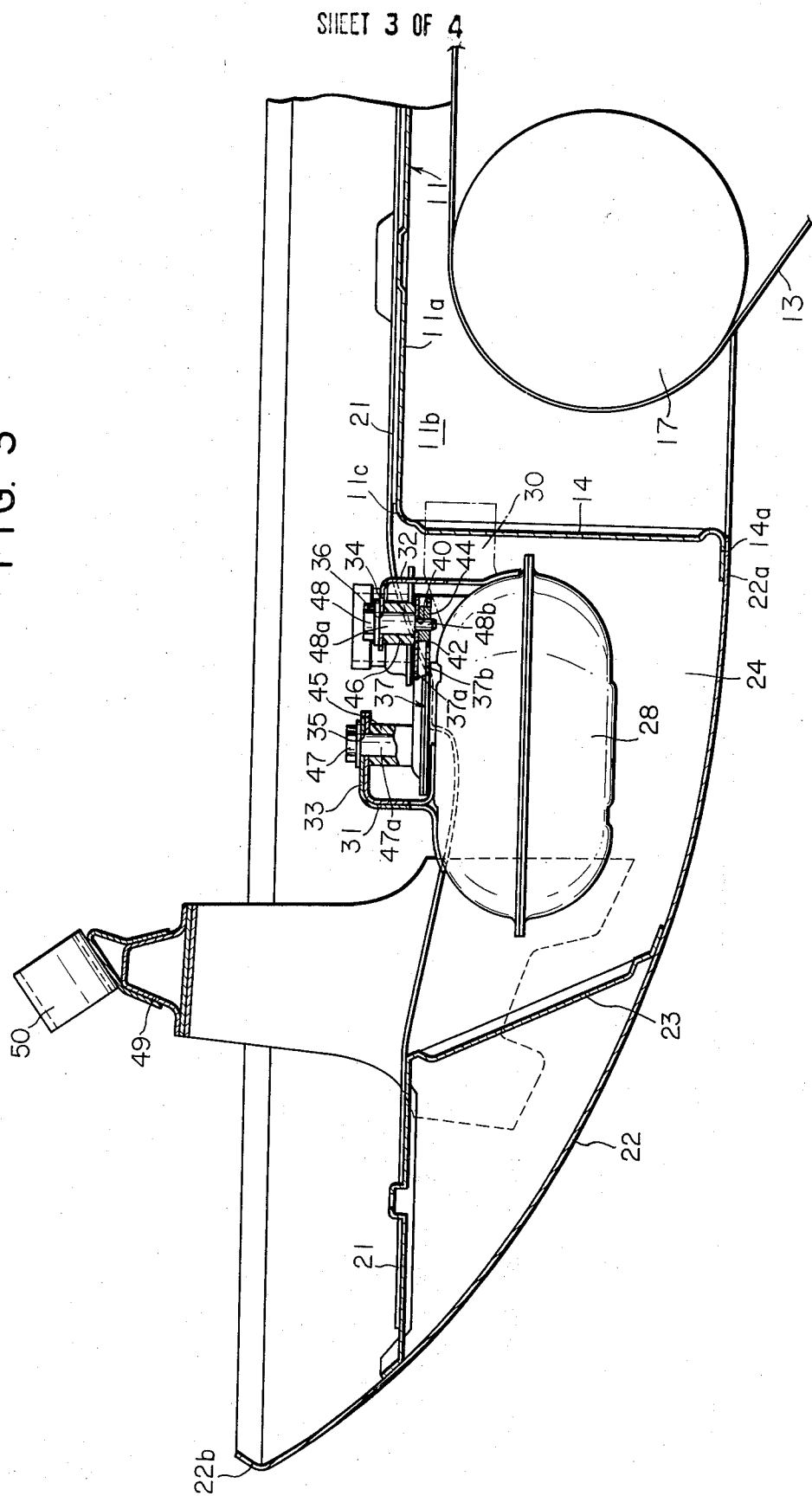
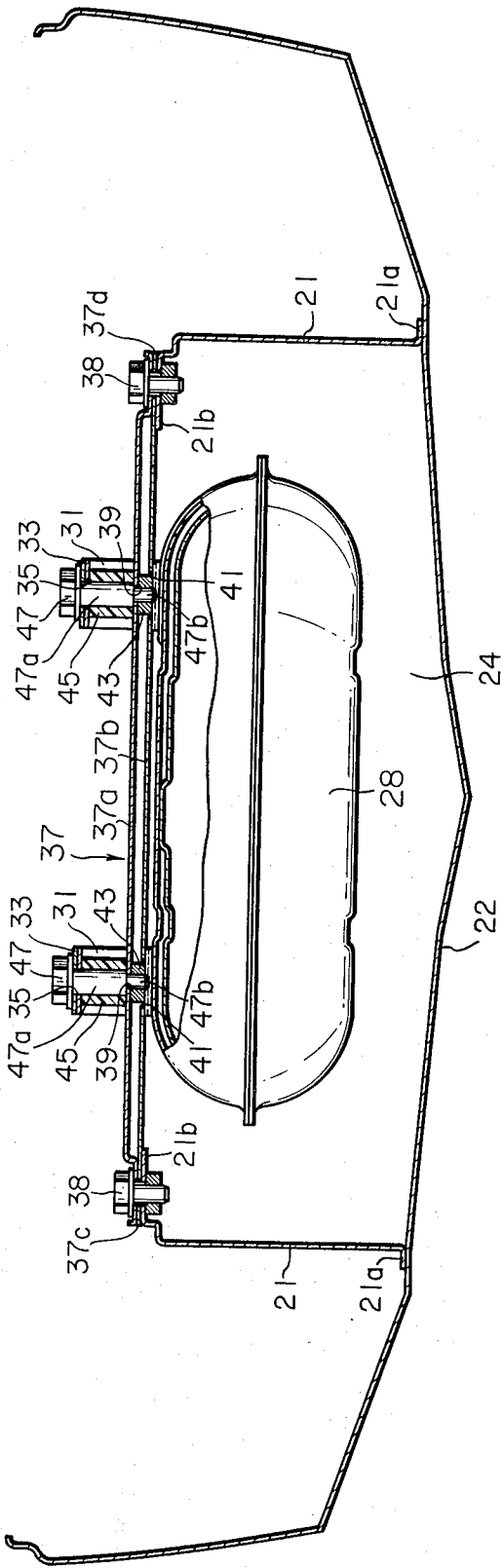


FIG. 4



SNOWMOBILE EXHAUST ARRANGEMENT

BACKGROUND OF THE INVENTION

This invention relates to a snowmobile capable of carrying one to three persons and more particularly to such a snowmobile in which an exhaust silencer is positioned in a well located at a forward lower portion thereof.

DESCRIPTION OF PRIOR ART

In a conventional snowmobile driven by an endless track, an internal combustion engine which drives the endless track is placed in a cowl which defines a front upper portion of the snowmobile. This requires that various elements associated with the engine be also placed in a limited space defined by the cowl. To satisfy this requirement, it has been necessary to select the shape of the cowl to increase said space or to make compact the elements associated with the engine.

An increase in the space within the cowl or miniaturization of the engine-associated elements, however, is necessarily subjected to limitation. In contradiction to the requirement pointed out above, a large exhaust silencer or a plural number of exhaust silencers must be provided if the noise caused by the exhaust gas from the engine should be efficiently reduced to a minimum. Providing such a silencer or silencers in the cowl has been difficult with a prior art snowmobile of the type described. In other words, it has been impossible to satisfactorily silence the noise caused by the exhaust gas.

Further, the space defined by a ship's bottom like front bottom plate of the body has been left merely as a dead space without utilization.

SUMMARY OF THE INVENTION

An object of the invention is to provide a small snowmobile in which a well is formed in a front bottom plate which has heretofore defined a dead space in order to substantially enlarge the available space in the cowl and in which an exhaust silencer is placed in the well to attain sufficient absorption of a noise.

The snowmobile according to this invention includes an inverted channel shaped main frame provided above an endless track and extending lengthwise thereof, said main frame comprising a top plate and a pair of main side plates, a main front plate positioned forwardly of the endless track and projecting downwardly from the front edge of the top plate, a pair of front side plates having rear ends superposed on the forward ends of the main side plates and extending forwardly of the snowmobile, and a forwardly progressively elevated front bottom plate having its rear end connected to the lower end of the main front plate and further connected to the lower edges of the front side plates at portions positioned inwardly of the side edges thereof.

In a well defined by the main front plate, front side plates and the front bottom plate is provided an exhaust silencer communicating via an exhaust tube with an internal combustion engine which is positioned on the forward end portion of a top plate of the main frame, whereby the space at the front bottom portion of the body, which otherwise remains as a dead space, can be fully utilized to provide a snowmobile of high noise silencing efficiency.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic cross sectional elevation of a snowmobile embodying this invention;

FIG. 2 is a cross section taken along the line 2—2 of FIG. 1;

FIG. 3 is a cross section taken along the line 3—3 of FIG. 2; and

FIG. 4 is a cross section taken along the line 4—4 of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the snowmobile embodying this invention comprises a body 10 including a main frame 11 extending horizontally rearwardly from the vicinity of a forward portion of the snowmobile and a cowl 12 which covers a front upper portion of the snowmobile.

The main frame 11 which is of an inverted channel shape lies above an endless track 13 for driving the snowmobile and has a top plate 11a and a pair of main side plates 11b formed at both sides of the top plate 11a. From the forward end 11c of the top plate 11a extends downwardly a main front plate 14 which may be formed integral with said top plate 11a or may be spot welded thereto (FIGS. 1 and 3).

An internal combustion engine 15 is placed within the cowl 12 by being secured to the forward end portion of the top plate 11a of the main frame 11. On the top plate 11a is also mounted a seat 16 which extends rearwardly from the vicinity of the engine 15.

The endless track 13 meshes at its forward extremity with a driving sprocket wheel 17 driven by the engine 15 and at its rear extremity with a rear sprocket wheel (not shown). Ahead of the endless track 13 are provided a pair of skis 18 whose direction can be controlled by a bar handle 19 through a steering column 20.

Referring to FIGS. 1 to 3, a pair of forwardly extending front side plates 21 having an inverted letter L shaped cross section are fixedly connected, such as by spot welding, to the main side plates 11b of the main frame 11. The rear halves of the front side plates 21 are adapted to cover the main side plates 11b, thereby reinforcing the front end of the main frame 11. As shown in FIGS. 1, 3 and 4, a front bottom plate 22 which is of a ship's bottom like cross section and whose bottom surface is gradually elevated frontwardly, has its rear end 22a connected, such as by spot welding, to the lower end 14a of the main front plate 14 and its front end 22b meets the forward end of the cowl 12. As viewed from FIG. 4, the flanged lower edges 21a of the front side plates 21 are rigidly secured, such as by spot welding, to the front bottom plate 22. Further, the front bottom plate 22 and the front side plates 21 are coupled at respective forward portions by a reinforcement member 23 so that they may be reinforced by each other (FIGS. 1 and 3).

In the cowl 12, a well 24 defined by the main front plate 14, front bottom plate 22 and front side plate 21 is formed just ahead of the internal combustion engine 15. In the well 24 is housed exhaust silencing means 26 for diminishing the noises produced by the exhaust gas from the engine 15. The exhaust silencing means 26 is entirely or partly housed in the well 24.

In the embodiment shown in FIG. 1, the exhaust silencing means 26 comprises an exhaust silencer 27 communicating directly with the exhaust pipe 25 and another exhaust silencer 28 connected via a connector pipe 29 to said exhaust silencer 27, and said another exhaust silencer 28 is disposed in the well 24. The entire structure of the exhaust silencing means 26, however, may be located in the well 24. The silencer 28 is connected to an exhaust gas outlet 30 which projects rearwardly from the silencer 28, passes through the main front plate 14 and is open in front of the endless track 13.

Referring to FIGS. 2 to 4, two double-layered brackets 31 and a single-layered bracket 32 located between said brackets 31 are mounted on the upper surface of the silencer 28. These brackets 31 and 32 have respectively integral arms 33 and 34 each projecting horizontally from the corresponding top thereof (FIG. 3) and which respectively have through holes 35, 36.

A stay 37 comprises two plates 37a and 37b horizontally spaced parallel with each other but having both end portions 37c and 37d joined together all along them. The joined end portions 37c and 37d are connected by bolts 38 to flanges 21b formed at the upper edges of the front side plates 21, whereby the stay 37 is bridged across over the well 24. As shown in FIGS. 3 and 4, three openings 39, 40 are formed in the upper plate 37a. In the lower plate 37b are similarly formed openings 41, 42 which are coaxial to said openings 39, 40 but have an increased diameter. Nuts 43, 44 are inserted through the openings 41, 42 and fused to the bottom surface of the upper plate 37a in axial alignment with the corresponding openings 39, 40. The arms 33, 34 of the brackets 31, 32 on the silencer 28 are positioned apart from the upper surface of the stay 37 respectively by those hollow cylindrical shock absorbers 45, 46 made of an elastic material, such as, rubber, which are mounted on the upper plate 38a in coaxial relationship with the openings 39, 40. In this case, the through holes 35, 36 in the arms 33, 34 are coaxial with the corresponding openings 39, 40 in the upper plate 38a. Bolts 47, 48 having reduced threaded portions 47b, 48b on the lower ends of their shanks 47a, 48a are inserted from above the arms 33, 34 through the through holes 35, 36 and the shock absorbers 45, 46 to permit the threaded portions 47b, 48b to be threadably tightened by nuts 43, 44, whereby, as shown in FIGS. 3 and 4, the silencer 28 is secured to the stay 37 within the well 24 by means of the bolts 47, 48 and nuts 43, 44 through the brackets 31, 32 and the shock absorbers 45, 46. The silencer 28 is thus resiliently suspended from the stay 37 so that an amount of vibration transmitted from the silencer 28 to the stay 37 may be reduced or absorbed by the shock absorbers 45, 46.

In front of the stay 37 and in parallel therewith is disposed another stay 49 which bridges the right and left side plates 21. The stay 49 has, on its upper central surface, a support 50 for the steering column 20 (FIG. 1) and, on its both ends, supports 52 for carrying ski columns 51 (FIG. 1) whose lower ends are pivotally connected to the skis 18.

In operation, when the driving sprocket wheel 17 is rotated by the internal combustion engine 15, the endless track 13 is actuated to drive the snowmobile. An exhaust gas emitted from the engine 15 is introduced

via the exhaust pipe 25 into the exhaust silencing means 26 where the noise caused by the exhaust gas is minimized in the following manner.

The exhaust gas is first led to the silencer 27 where an amount of the noise thereof is reduced and then sent via the connector pipe 29 into the silencer 28 in the well 24, where such reduced amount of noise is further diminished before the gas is discharged under the main frame 11 through the exhaust gas outlet 30. According to this invention, use of the two separate silencers 27, 28 enables the noise generated by the exhaust gas to be fully lessened.

It will be clear from the foregoing that the well 24 which has heretofore been a dead space can be utilized to promote noise absorption efficiency for the exhaust gas by placing the silencer 28 within the well 24 which is defined by the main front plate 14 located at the forward end of the main frame 11, the front side plates 21 and the front bottom plate 22 forming a forward bottom portion of the body 10. In the illustrated embodiment, only the silencer 28 has been described to be placed within the well 24, but it should be understood that both of the silencers 27, 28 may be housed in the well 24. Further, when only a single silencer is sufficient for silencing the noise, such single silencer may be placed within the well 24. Positioning a silencer or silencers in such a place increases the available space within the cowling 12 and such increased space can be utilized to include additional devices or elements associated with the operation of the engine 15, or to permit various devices to become large-sized, in the absence of such additional elements as the silencers.

What is claimed is:

1. A snowmobile comprising:

- an inverted channel shaped main frame having a top plate;
- an endless track equipped under said main frame;
- an internal combustion engine mounted on the front end portion of said top plate for driving said endless track;
- a pair of front side plates connected with said main frame and projecting forwardly therefrom;
- a main front plate extending downwardly from the front end of said main frame;
- a forwardly progressively elevated front bottom plate fixed to the lower edges of said front side plates and having the rear end connected with the lower end of said main front plate, said front bottom plate having the shape of the hull of a vessel;
- a first exhaust silencer connected with said engine; a second exhaust silencer connected with said first exhaust silencer and disposed in a well defined by said front side plates, main front plate and front bottom plate, thereby utilizing the space of said well; and
- a stay positioned over said well for suspending said second exhaust silencer.

2. A snowmobile according to claim 1 wherein said stay bridges said pair of front side plates over said well and is fixed to said second exhaust silencer.

3. A snowmobile according to claim 2 wherein there are provided, on said second exhaust silencer, brackets fixed to said stay for suspending said second exhaust silencer therefrom.

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