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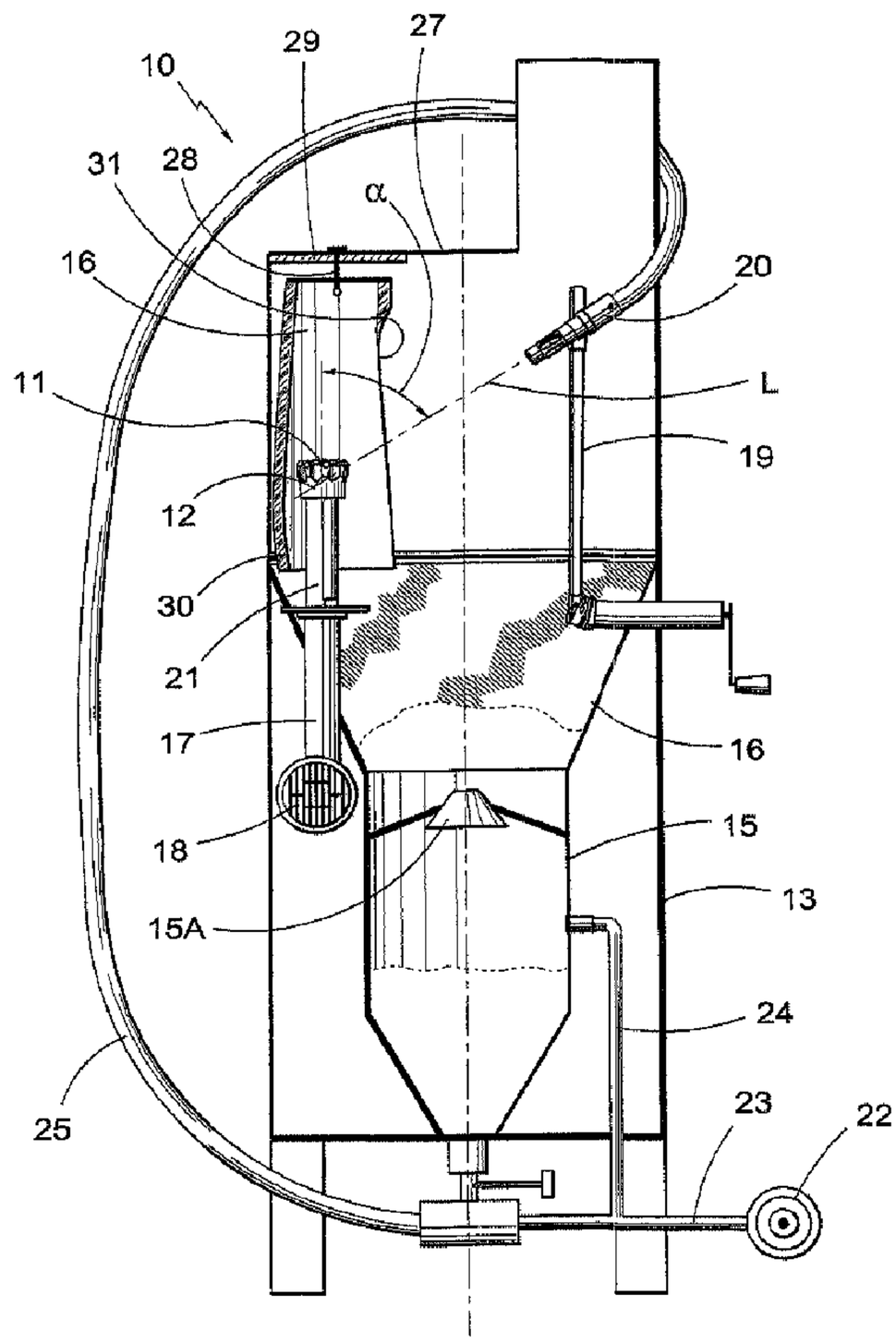
(54) Title: BLASTING APPARATUS FOR THE BLASTING OF A ROCK DRILL BIT



(57) Abrégé/Abstract:
The present invention relates to a blasting apparatus (10) for blasting rock drill bits comprising a blast nozzle (20) for conducting a pressurized blast medium towards a rock drill bit, said nozzle having a direction (L), a fixture (17,21) for the location and rotation of

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(57) Abrégé(suite)/Abstract(continued):
the rock drill bit and a first chamber (14), which surrounds blast nozzle (20) and at least a part of the fixture (21), as well as means (15,23,25) for the forwarding of blast medium. A second chamber (26) is mounted in the first chamber (14). The second chamber (26) is arranged to, at least partially enclose, the fixture (17,21). The second chamber (26) is movable in said direction (L). The second chamber (26) has an opening (31) located between the fixture (17,21) and the blast nozzle (20).

11924DE 2004-05-12

Summary

The present invention relates to a blasting apparatus (10) for blasting rock drill bits comprising a blast nozzle (20) for conducting a pressurized blast medium towards a rock drill bit, said nozzle having a direction (L), a fixture (17,21) for the location and rotation of the rock drill bit and a first chamber (14), which surrounds blast nozzle (20) and at least a part of the fixture (21), as well as means (15,23,25) for the forwarding of blast medium. A second chamber (26) is mounted in the first chamber (14). The second chamber (26) is arranged to, at least partially enclose, the fixture (17,21). The second chamber (26) is movable in said direction (L). The second chamber (26) has an opening (31) located between the fixture (17,21) and the blast nozzle (20).

(Fig. 1B)

BLASTING APPARATUS FOR THE BLASTING OF A ROCK DRILL BIT

Technical Field of the Invention

The present invention relates to a blasting apparatus for the blasting of a rock drill bit, such as the same is defined in the preamble of the appended independent claim.

When rock drill bits are used, the cemented carbide buttons are worn so that the rock drill bit has to be disassembled and the buttons be ground by means of, for instance, a grinding cup of the type shown in US-A-5,964,649. If the buttons have been worn so much that the same cannot be reground, there is a plurality of ways to machine the surrounding steel on the front surface of the drill bit, such as blasting, grinding or milling, in order to obtain the requisite cemented carbide material. By SE-A-7609765-8, it is previously known to blast rock drill bits. One problem in blasting is that the surrounding parts of the blasting equipment, such as a hood, is damaged or eroded during the blasting process. Another problem is that the known technique requires large amounts of air, and thereby expensive compressors. Other known blasting machines are shown in US-A-5,029,595 and WO-A1-9105635.

Objects of the Invention

One object of the present invention is to provide a blasting apparatus for the blasting of rock drill bits, which avoids the disadvantages of prior art.

Another object of the present invention is to provide a blasting apparatus for the blasting of rock drill bits, which does not erode other equipment in the blasting apparatus.

Another object of the present invention is to provide a blasting apparatus for the blasting of rock drill bits, which reduces the consumption of air.

Another object of the present invention is to provide a blasting apparatus for the blasting of rock drill bits, which is simple to use.

Another object of the present invention is to provide a blasting apparatus for the blasting of rock drill bits, which is careful towards the abrasive particles of the blasting medium.

The above-mentioned objects of the present invention are realized by means of a blasting apparatus for the blasting of a rock drill bit, such as it is defined in the features in the appended claims.

Description of the Drawings

Below, an embodiment of a blasting apparatus for the blasting of a rock drill bit according to the present invention will be described, reference being made to the appended drawings. Fig. 1A shows a blasting apparatus according to the present invention in a perspective view. Fig. 1B shows the blasting apparatus in cross-section. Fig. 1C shows the blasting apparatus in perspective view having an opened hood. Fig. 1D shows a fixture in the blasting apparatus in perspective view. Fig. 1E shows a part of the blasting apparatus and Fig. 1F shows an enlarged detail of the part according to Fig. 1E in enlargement.

Detailed Description of the Invention

Reference being made to Figs. 1A–1F, hereinafter a blasting apparatus 10 according to the present invention is described, for blasting of steel from a front surface 11 of a rock drill bit 12. The blasting apparatus 10 comprises a support part 13 and a hood or first chamber 14. The hood 14 is openable in relation to the support part via hinges and is preferably rubber lined internally. The support part 13 comprises a pressure tank 15 intended to hold blast sand, a collecting member 16 in order to collect down-falling blast sand and metal particles, a rotatable fixture 17 connected to a rotation motor 18, and a stand 19 in order to hold a blast nozzle 20. The blast nozzle 20 conducts a pressurized blast medium towards the rock drill bit 11 in a direction L. The rock drill bit 11 is intended to, in a simple way, be fastened in the fixture and be

rotated by about 15–20 revolutions per minute. The fixture 17 has an upper releasable part 21, the geometry of which is adapted to the bit shape in question. A schematically shown compressor 22 is intended to feed the blasting apparatus 10 with pressurized air via pipes. The pressure tank has a non-return valve 15A. In connection with the pressure tank 15, suitable valves are arranged.

In the example shown, the hood 14 has substantially a box shape. A hollow damper or a second chamber 26, partially open at least from the side, is mounted hanging in an upper part 27 of the hood. The second chamber is thus mounted in the first chamber. The hood has an elevated part in order to house a stand and a part of a pipe 25 as well as a recess for a dust collector. The pipe 25 is positioned within the apparatus 10 but has for the sake of clarity been drawn outside the same in Fig. 1B. The damper has during tests consisted of a steel-reinforced rubber tube having a material thickness of 10 mm and an inner diameter of 200 mm. By the term "tube" is meant that also tubes with non-circular cross-sections are included.

The damper 26 is substantially tubular and so mounted in the upper part that it may oscillate around an axis X defined by two diametrically opposite spigots 28 co-operating with the corresponding holes in the damper 26. The axis X is substantially perpendicular to the rotational axis of the fixture 17. Thereby, the damper is at least partially movable in said direction L and the free end 30 of the damper is pivotable in said direction L. Furthermore, the spigots 28 are connected to the upper part 27 by means of, for instance, screws. An additional protective plate 29 is arranged between the damper and the upper part. The protective plate 29 is preferably rubber lined in order to decrease erosion on the upper part. The damper 26 is arranged to, at least partially, enclose the releasable part 21 of the fixture. The damper has an opening 31, the position of which in relation to the nozzle 20 is controlled by the spigots 28. The opening 31 is located between the releasable part 21 and the blast nozzle 20.

The damper 26 has a substantially U-shaped cross-section at the opening 31. The damper is at least long enough for the free end 30 to reach be-

neath the front of the releasable part 21 when the damper hangs assembled in the hood, preferably a distance down into the support part 13.

The blasting apparatus 10 operates in the following way, reference foremost being made to Fig. 1B. The hood 14 is opened and blast sand is charged in the tank 15 through the open non-return valve 15A. The rock drill bit 12 is applied in the upper part 21 of the fixture, conveniently so that the parts of the bit that are not to be blasted, such as threads or splines, are protected by the upper part 21. The blast nozzle 20 is adjusted along the stand 19 so that the centre line of the nozzle forms an acute angle α of maximum 45°, preferably about 42–43° to the rotational axis of the fixture 17, in order to conduct the pressurized blast medium towards the rock drill bit 11 in a direction L. The nozzle 20 is arranged about 7–10 cm from the drill bit or the fixture. Then, the hood 14 is closed and is locked. Subsequently, the compressor is started 22 so that the tank 15 is pressurized via the pipes 23 and 24. Thereby, sand is forced down through a valve having suitable throughput capacity and outwards into the pipe 25 to be forwarded to the nozzle 20. Preferably, the motor 18 is started at the same time as the compressor. Thereby, the sand is blown in the direction L towards the front surface 11 through the opening 31 in the damper 26 and cuts steel from the front surface while the rock drill bit rotates. The blast sand then bounces on towards the damper 26 so that the damper oscillates in the direction towards the nearest wall in the hood 14. The speed of the individual sand particles is damped substantially by the motion of the damper. The cemented carbide buttons in the front surface remain substantially unaffected by the blasting. Regarding the object of reduced air consumption the theory is that at least a part of the blasting medium is recirculated in the second chamber after initial hitting against the drill bit front face for quickly reverting into the blasting stream and thereby further blasting the drill bit. Our tests have shown an increased productivity. A faster machining consequently provides reduced air consumption per drill bit. It has turned out in tests that the pressure performance of the compressor could be lowered by 50 % to 5,5 bar and that the air consumption decreased by 75 %. Thereby, the blasting apparatus may be used together with inexpensive compressors. Because of the motion of the

damper 26, substantially no erosion of the hood 14 takes place so less hood walls need rubber lining. Furthermore, because of the oscillation, the blast stream is directed downwardly in the direction towards the pressure tank so that the sand returns fast to the tank.

It is implicit that the blasting apparatus may be modified within the scope of the present invention. For instance, the oscillating mounting of the damper may be arranged in other ways, such as by means of a flexible intermediate portion or the like. Furthermore, the material in the damper may be varied.

Thus, the present invention relates to a blasting apparatus for the blasting of rock drill bits, which does not erode other equipment, which requires relatively small amounts of air, which is simple to use, and which is careful towards the abrasive particles of the blasting medium.

The disclosures in Swedish patent application No. 0301675-5.

Other embodiments of the invention will be apparent to those skilled in the art from a consideration of the specification or practice of the invention disclosed herein. It is intended that the specification and the example be considered as illustrative only, with the true scope of the invention being indicated by the following claims.

Claims

1. A blasting apparatus for blasting rock drill bits comprising:

- a blast nozzle (20) for conducting a pressurized blast medium towards a rock drill bit, said nozzle having a direction (L),
- a fixture (17, 21) for the location and rotation of the rock drill bit, and
- a first chamber (14), which surrounds the blast nozzle (20) and at least a part of the fixture (21), and
- means (15, 23, 25) for the forwarding of blast medium,

characterized in that a second chamber (26) is mounted in the first chamber (14) and in that the second chamber (26) is arranged to at least partially enclose the fixture (17, 21), the second chamber (26) being movable in said direction (L) and in that the second chamber (26) has an opening (31) located between the fixture (17, 21) and the blast nozzle (20).

2. The blasting apparatus according to claim 1, characterized in that the second chamber (26) is arranged hanging in an upper part (27) of the second chamber (26).

3. The blasting apparatus according to claim 1 or 2, characterized in that the free end (30) of the second chamber (26) is pivotable in said direction (L).

4. The blasting apparatus according to any one of claims 1 to 3, characterized in that the second chamber (26) is substantially tubular.

5. The blasting apparatus according to any one of claims 1 to 4, characterized in that the second chamber (26) has a substantially U-shaped cross-section at the opening (31).

6. The blasting apparatus according to any one of claims 1 to 5, characterized in that the second chamber (26) is at least so long that the free end (30) reaches underneath a front of the fixture (21).

7. The blasting apparatus according to any one of claims 1 to 6, characterized in that the fixture (17, 21) is rotatable around a rotational axis.

8. The blasting apparatus according to any one of claims 1 to 7, characterized in that the blast nozzle (20) is adjustable along a stand (19) so that a centre line of the nozzle forms an acute angle (α) to the rotational axis of the fixture (17, 21), in order to conduct the pressurized blast medium towards the fixture (17, 21) in a direction (L).

9. The blasting apparatus according to any one of claims 1 to 8, characterized in that the blast nozzle (20) is arranged about 7-10 cm from the fixture (17, 21) and in that the acute angle (α) is maximum 45°.

10. The blasting apparatus of claim 9, wherein the angle (α) is about 42° to 43°.

Fig. 1A

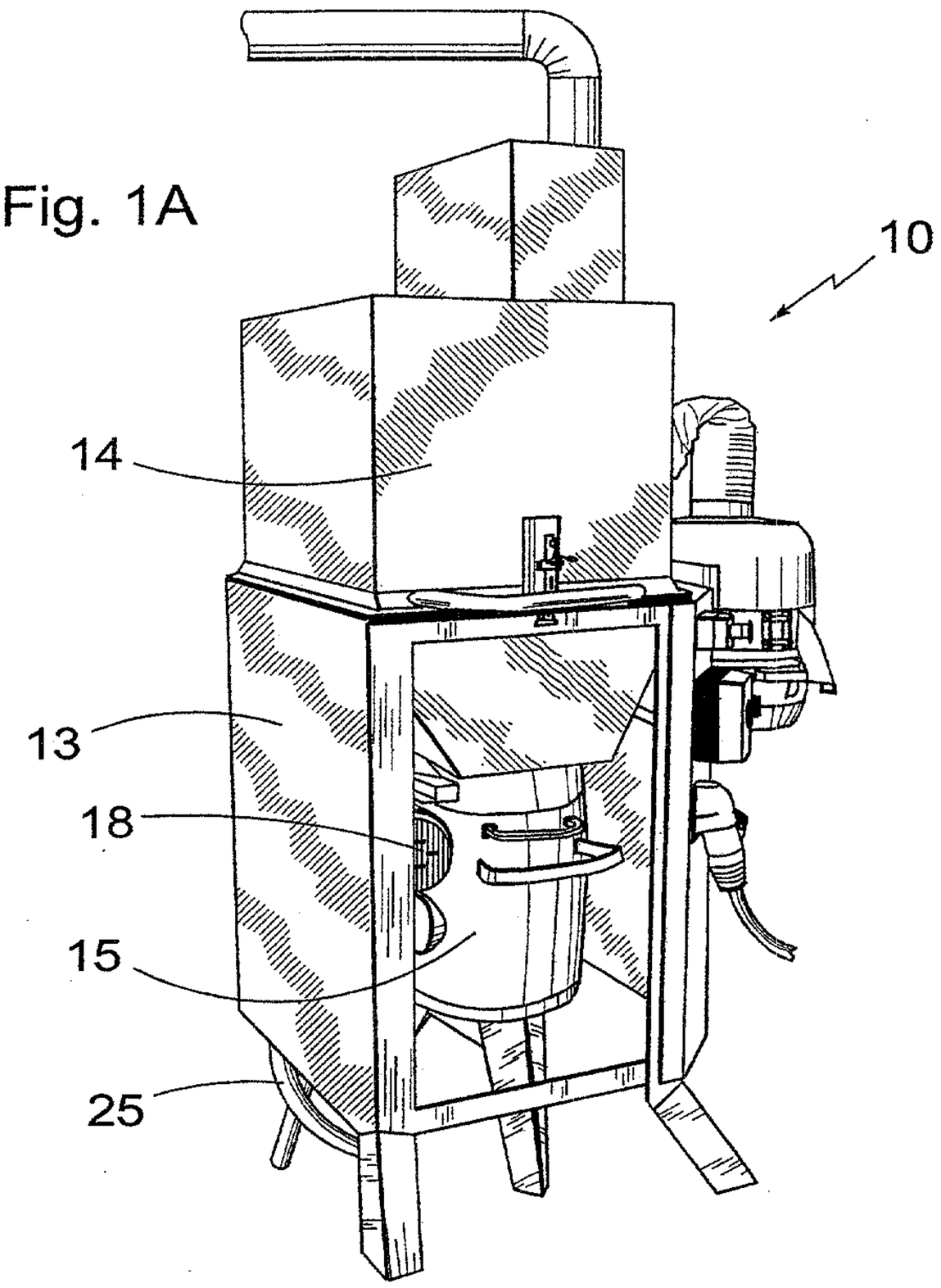
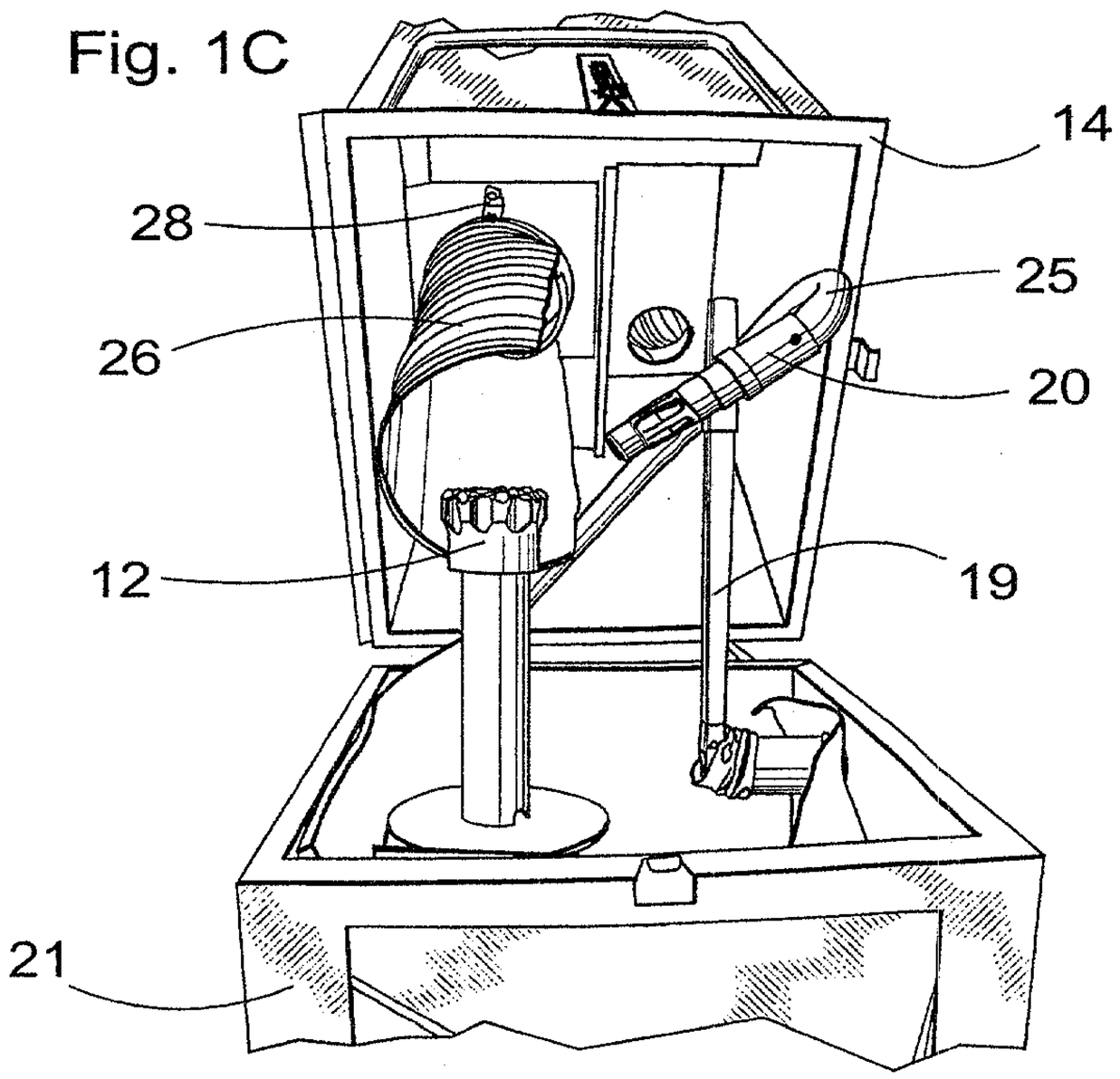


Fig. 1C



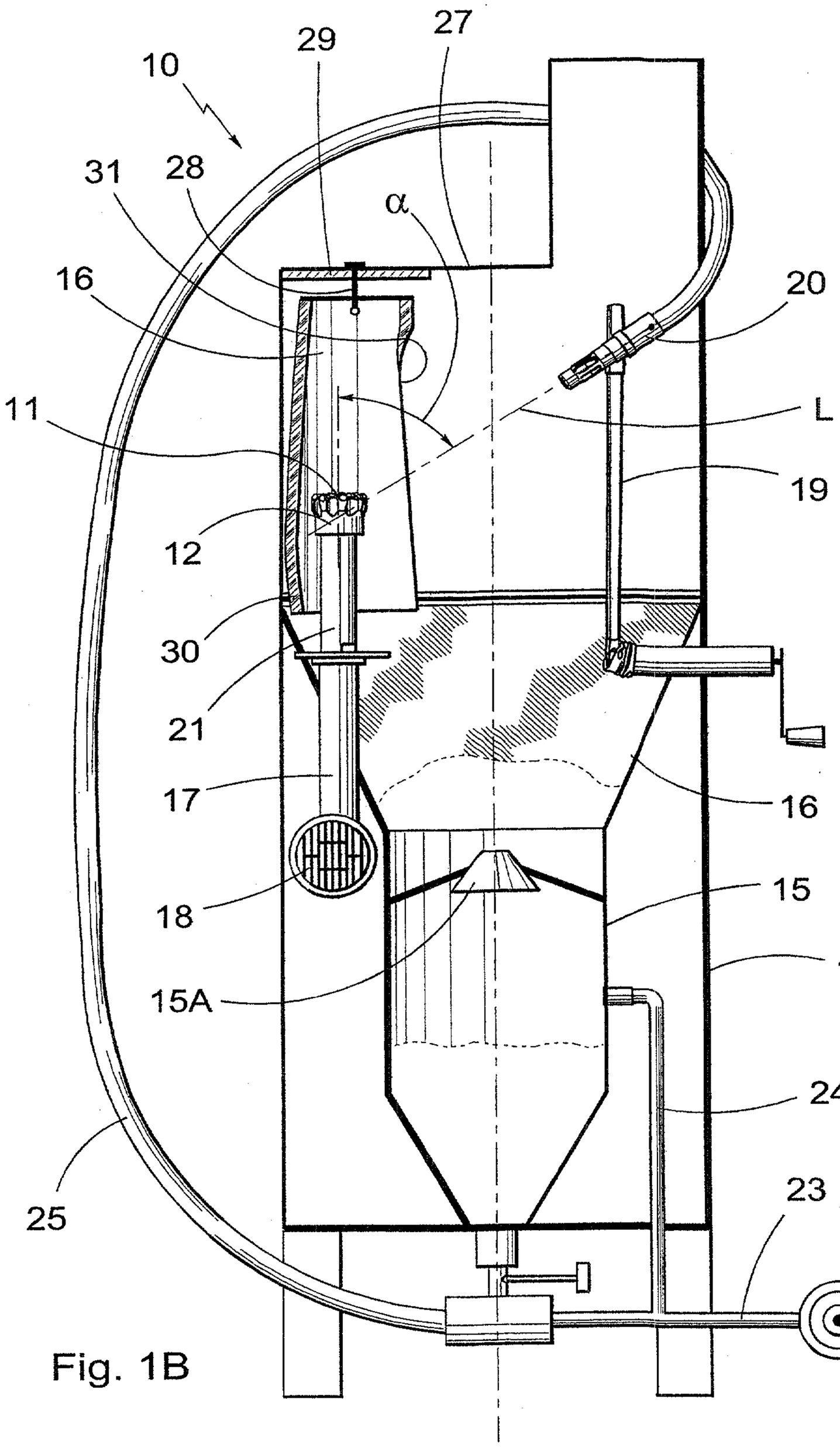


Fig. 1B

Fig. 1D

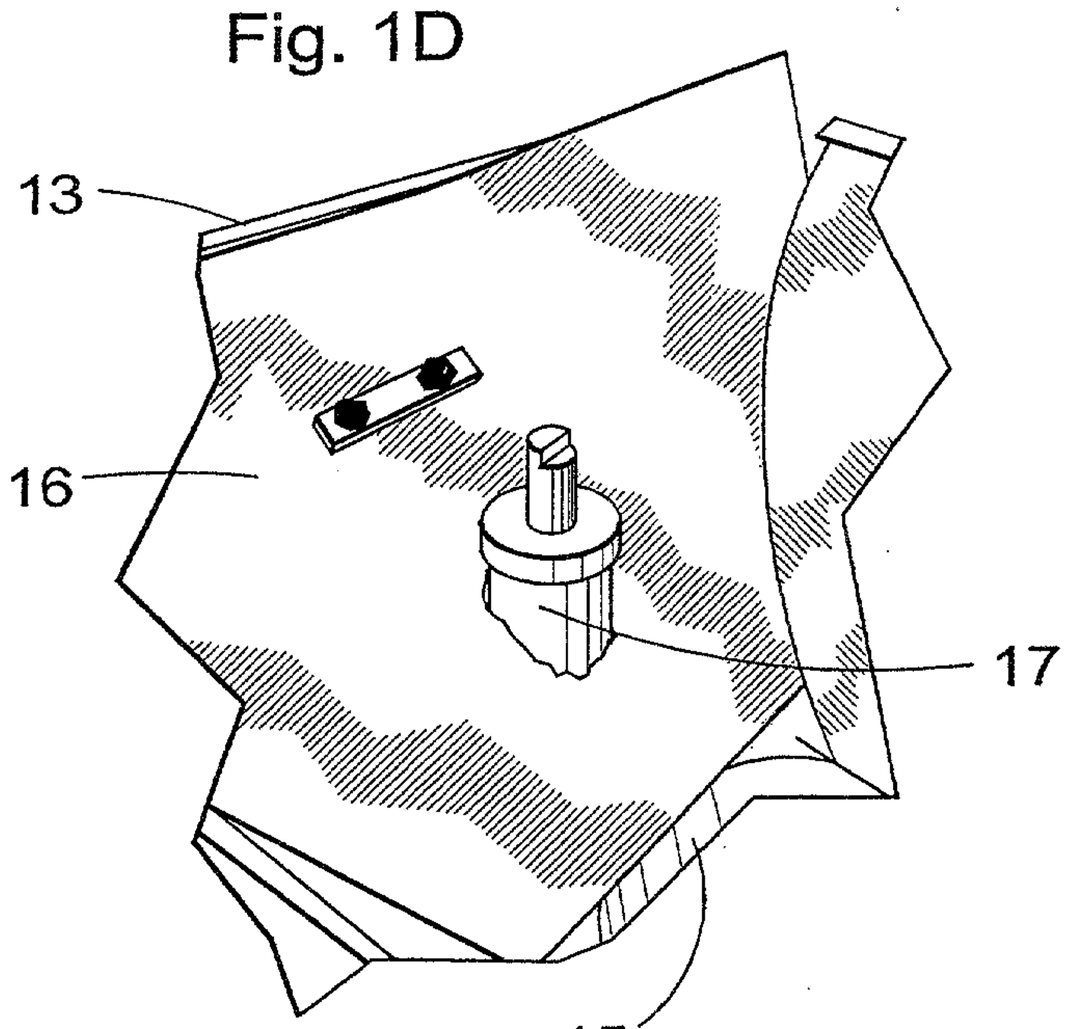


Fig. 1E

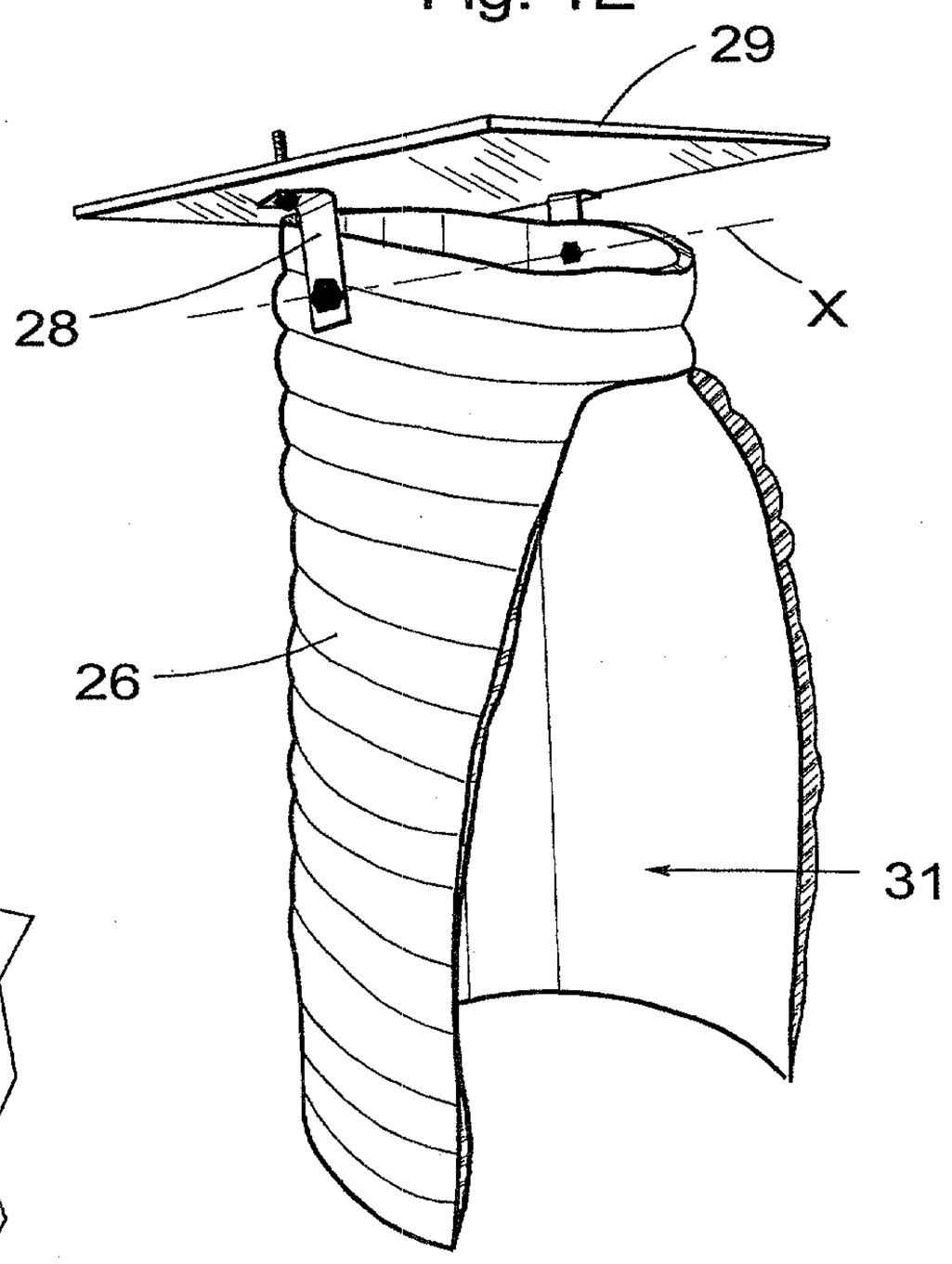
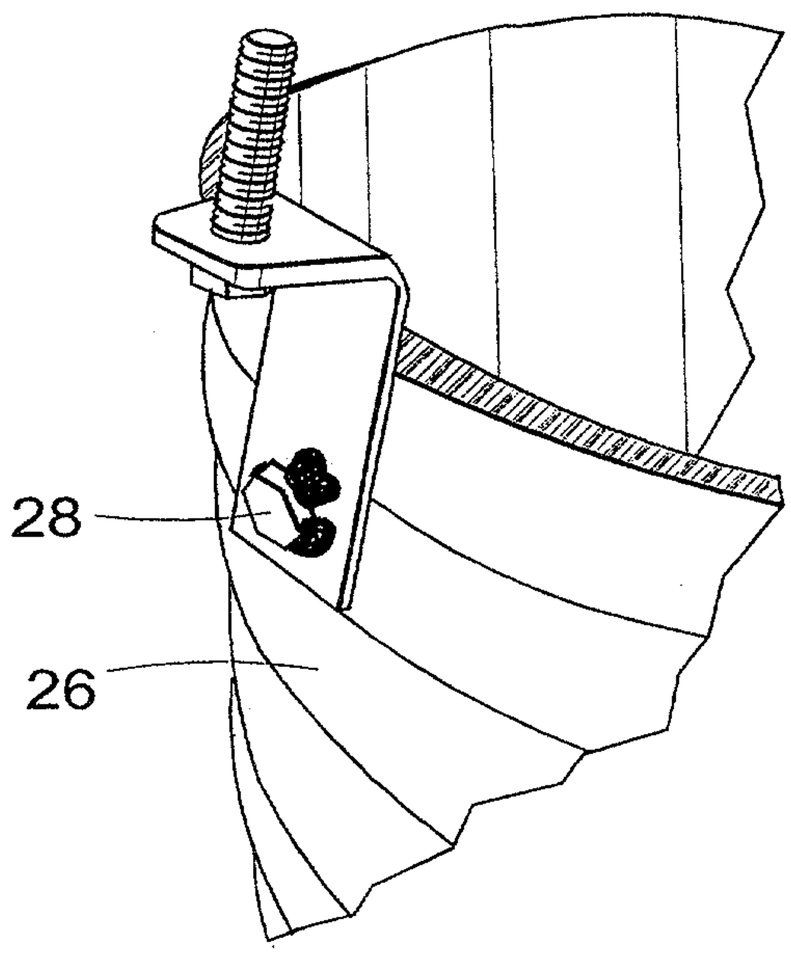
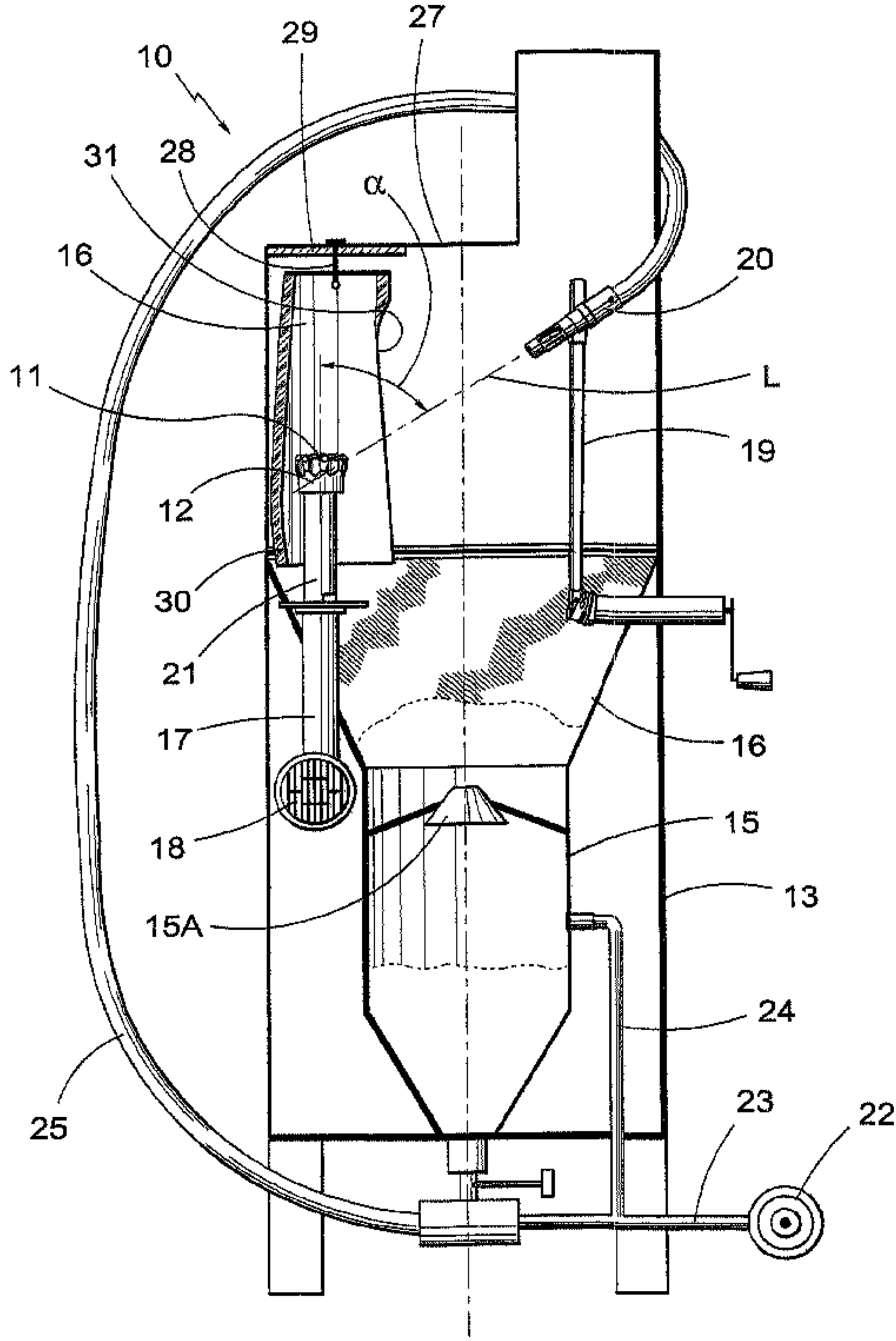


Fig. 1F

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