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(71) Applicant: **BITELLI SPA**
40061 Minerbio (BO) (IT)

(72) Inventors:
- **Gelai, Luciano**
  36073 Cornedo Vicentino (VI) (IT)
- **Venturi, Bruno**
  40133 Bologna (IT)

(74) Representative: **Bonini, Ercole**
c/o STUDIO ING. E. BONINI SRL
Corso Fogazzaro 8
36100 Vicenza (IT)

(54) A perfected road scarifying machine for the removal of road surfacings

(57) The invention discloses a road scarifying machine (1) for road surfacings which comprises a frame (2) mounted on wheels (3) which supports a milling drum (6) connected to power means suited to drive it into rotation in order to crush said road surfacing (7) with which it comes into contact. Transversally to said frame (2) there are conveyance means (9) suited to discharge to the side of the road scarifying machine (1) and off the working area (72) of the milling drum (6) the debris (71) resulting from the crushing of the road surfacing (7) itself.

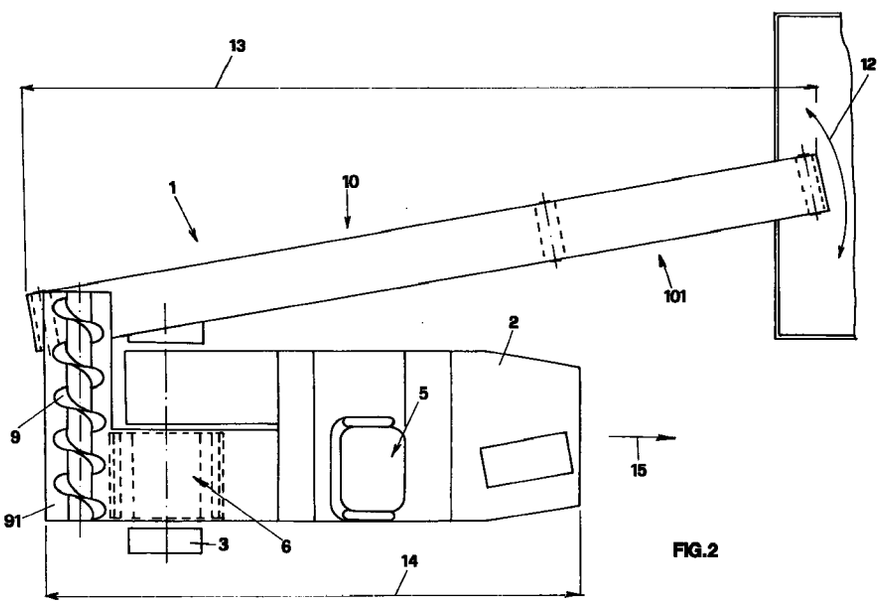

FIG.2

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Description

The invention concerns a the road scarifying machine used for the removal of road surfacings, equipped with an auger for the lateral discharge of the debris resulting from the crushing of the road surfacing.

It is a known fact that road scarifers are machines used for the removal of the asphalt surfacing which covers the roadways. They essentially comprise a wheel-mounted frame, provided with a driving unit, with a driver's seat and with a milling drum which comes into contact with the road surfacing to be removed.

The milling drum is driven into rotation and, by means of the peripheral projections with which it is provided, it crushes the road surfacing with which it is in contact and into which it penetrates.

The debris of said crushing is a material which can still be used for subsequent use and, therefore, it is removed from the working area of the milling drum before any subsequent digging is done.

In one preferred embodiment, the road scarifying machines are equipped with the milling drum only, but they do not present any suitable means to permit to move the crushed material away from the working area.

For the removal of such material, therefore, it is necessary to intervene afterwards with a working force who load the crushed material on means of transport by using spades, shovels, or power shovels, buckets and similar.

It is easy to understand that such an operating method is not economical, since it requires the employment of many labourers and a rather long operation.

In order to overcome such inconveniences, road scarifying machines equipped with a conveyor belt have been realized. Said belt is directly loaded with the debris of the crushing of the road surfacing during the crushing itself, because of the action of the centrifugal force that the milling drum impresses on the material itself during the crushing. The conveyor belt then conveys the debris of the crushing to a lorry which co-operates with the road scarifying machine during the work. The debris can then be transferred to a collecting area, ready for a subsequent reutilization.

The described road scarifying machines complete with a conveyor belt are realized according two different embodiments.

One embodiment foresees for the conveyor belt to be arranged in front of the machine. This is the preferred solution in the machines of large dimensions which are provided with a milling drum, usually having a width of more than a meter. They permit to remove large bulks of material over large widths and, therefore, they are used to perform works especially on roads presenting a wide carriageway such as freeways, motorways and similar.

Another embodiment foresees for the conveyor belt to be arranged at the rear of the machine. This embodiment is preferred for the road scarifying machines which present milling drums having a limited width and, therefore, suited to perform localized removals, such as diggings for the laying of pipelines or electrical cables.

The fact for the conveyor belt to be arranged in front or at the rear of the road scarifying machine, entails anyway some problems to the use of the machine itself.

A first problem is that the presence of such a conveyor belt, whether it is positioned in front of or behind the road scarifying machine, increases the overall dimensions of the machine, thus making it more difficult to drive it and, therefore, reducing its control.

Another problem that is found especially in the road scarifying machines provided with a front conveyor belt, is the reduction of visibility that the presence of said belt causes to the driver.

Such a poor visibility makes the driving particularly difficult, especially when considering that during the work the driver must keep the conveyor belt centered and close to the loading part of the lorry which precedes the road scarifying machine and on which the conveyor belt loads the material.

On the other hand, another incovenience presented by the road scarifying machines provided with a conveyor belt positioned at their rear is that the driver must constantly turn to check that the conveyr belt is correctly positioned in relation to the loading part of the lorry for the discharge of the material, and his attention is, therefore, partly diverted away from the driving.

Not the last inconvenience presented by said road scarifying machines provided with a conveyor belt arranged at the rear, is that the manufacturer must ballast the machine in the front, in order to balance the weight of the conveyor belt. As a consequence, there is an increase in the manufacturing costs and an increase of the vertical overall dimension which implies a further decrease of the visibility during the progress of the machine.

The present invention proposes to overcome all the mentioned limitations and inconveniences.

In particular, one of the purposes of the invention is to realize a road scarifying machine which permits to clear immediately the area of the roadway where the milling drum is operating from the debris resulting from the crushing of the road surfacing itself.

Another purpose of the machine according to the invention, should it be provided with a conveyor belt for the conveyance of the debris to a means of transport, is to give the driver a better view of the surronding working area, as compared with the road scarifying machines belonging to the known technique complete with a conveyor belt and equivalent to it.

Not the last purpose is for the road scarifying machine according to the invention, should it be provided with a conveyor belt, to make it possible for the driver to check the position of the conveyor belt in relation to the loading part of the lorry where the removed road surfacing is loaded, without him having to turn and, therefore, to divert his attention from driving the vehicle.

The described purposes are achieved by a road scarifying machine for the removal of road surfacings which, in accordance with the main claim, comprises:

- a wheel-mounted frame which supports at least one driving unit and at least one driver's seat;
- a milling drum connected to said frame and mechanically connected to power means suited to drive it into rotation in order to crush said road surfacing with which it comes into contact,

and is characterized in that it is provided with conveyance means arranged essentially transversal in relation to said frame, suited to transfer to the side of the road scarifying machine and off the working area of the milling drum the debris resulting from the crushing of the road surfacing, which is loaded onto them by a centrifugal force because of the rotation of said milling drum.

According to one preferred embodiment, said conveyance means preferably consist of a rotating auger lodged inside a collecting channel, also connected to the frame of said road scarifying machine and arranged at the rear of said milling drum, within which the crushed material is collected and conveyed by the rotation of said milling drum.

Still according to said preferred embodiment, a conveyor belt can be arranged along one of the sides of the road scarifying machine, which receives the material coming out from the auger and conveys it to a means of transportation.

Preferably, the auger is arranged in a slanted position in relation to the conveyor belt with a bottom-to-top inclination, according to its direction of conveyance of the material.

The conveyor belt is hinged on the frame of the road scarifying machine and can be made to project laterally

Advantageously, the presence of the auger conveys on the side of the machine the debris resulting from the crushing of the road surfacing, thus clearing immediately the working area of the milling drum where it is possible to start immediately the digging or the asphalt covering operations. The recovery of the crushed road surfacing, which can be re-used, is done afterwards through its collection with spades, power shovels, buckets and similar.

With advantage, should the road scarifying machine be realized according to the embodiment which also foresees the lateral conveyor belt, the debris resulting from the crushing can be immediately transferred from the working area to a collecting area to be re-used afterwards. The presence of such a lateral conveyor belt reduces the overall dimensions of the machine and permits a better handling during its operation.

Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter.

However, it should be understood that the detailed description and specific example, while indicating a preferred embodiment of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description and from the drawings, wherein:

- Fig. 1 shows in a lateral representation the road scarifying machine according to the invention;
- Fig. 2 shows the plan view of the road scarifying machine of Fig. 1;
- Fig. 3 shows the rear view of the road scarifying machine of Fig. 1.

It is pointed out that a description is made hereinafter of a road scarifying machine complete with an auger and with a lateral conveyor belt which is continually loaded with the debris resulting from the crushing and conveyed by the auger.

The present description, however, - and this will be also pointed out again whenever it is necessary - is fully applicable to a road scarifying machine complete with an auger but without a conveyor belt.

As can be observed in the Figs. 1 and 2, the road scarifying machine according to the invention, indicated as a whole with 1, comprises a frame 2 mounted on wheels 3 which supports a driving unit 4 and a driver's seat, indicated as a whole with 5. Under frame 2 and behind the driver's seat 5, there is a milling drum 6 which is connected to frame 2 and which is put into contact with the road surfacing to be removed 7 into which it penetrates by a depth 8 which essentially corresponds to the thickness of the asphalt to be removed.

Said milling drum 6, as can be observed in particular in Fig. 3, is provided with a plurality of milling elements 61 and is driven into rotation by a shaft 62 mechanically connected to said driving unit 4 through mechanical means 4, not represented in the drawings.

During the rotation of the milling drum 6, which occurs following the anti-clockwise direction pointed by arrow 63, the milling elements 61 crush the road surfacing 7 and discharge the debris, following direction 64, into a collecting channel 91 within which there are conveyance means consisting of an auger 9.

Said auger 9, as can be observed in Fig. 3, is arranged transversally to frame 2 of the road scarifying machine and it transfers said debris 71 produced by the crushing of the road surfacing 7, to the side of the working area 72. In said area 72, thus clear from the debris of the crushing, the next digging or asphalt covering operations can then start immediately.

The crushed material is piled on the carriageway, beside the operating area of the milling drum and is picked up afterwards in order to be used again, after undergoing a suitable treatment.

Should the road scarifying machine be provided with a lateral conveyor belt 10, the auger transfers directly said debris 71 on to the lateral conveyor belt 10,

which is arranged with a bottom-to-top inclination, in order to convey it into the loading part of lorry 11 proceding ahead of the machine. For this purpose, it can be observed that also the auger is slanted from bottom-to-top according to the direction of the material discharge, so as to permit the material itself to be loaded on the conveyor belt 10.

In that case, the advantage yielded is that, besides clearing the operating area 72 from the debris 71 of the crushing, the latter is also immediately moved away and piled up in a collecting area for a subsequent re-use.

Moreover, as can be observed in the plan view of Fig. 2, said conveyor belt 10 is hinged on frame 2 of the road scarifying machine by means of pivoting means, not represented in the drawings but belonging to the known technique, and is connected to driving means, also not represented in the drawings but belonging to the known technique, by means of which it can be made to project in an essentially horizontal plane, following any of the directions pointed by arrow 12.

It is important to make some remarks regarding the lateral arrangement of the conveyor belt 10.

It can be observed, first of all, because said conveyor belt 10 is arranged alongside the scarifying machine, its total length 13 is partly covered by the length 14 of the road scarifying machine 1. The total length of the road scarifying unit is reduced and it presents, therefore, a better manoevrability as compared with road scarifying machines equivalent to it and provided with a front or a rear conveyor belt.

It must also be considered that the lateral arrangement of the conveyor belt 10 gives the driver a better visibility as compared with equivalent road scarifying machines in which the conveyor belt is arranged in front. This is true during the progress of the road scarifying machine but especially during the working phase. In fact, the loading part of lorry 11 proceeding ahead of the road scarifying machine, can be offset in relation to the loading direction 15 of the road scarifying machine itself.

In addition, the road scarifying machine according to the invention, as compared with equivalent road scarifying machines provided with a rear conveyor belt, permits the driver to operate without having to turn constantly to check the position of the belt in relation to the loading part of the lorry which receives the debris resulting from the crushing.

In Fig. 1 it is also interesting to observe that the front part 101 of the conveyor belt 10 can be arranged according to the configuration represented with a dotted line. This fact allows a better control of the machine during its progress and smaller overall dimensions for parking, as compared with machines equivalent to it and presenting a front or a rear conveyor belt.

Besides what has been said, the lateral arrangement of the belt does not require the balncing ballast and, therefore, permits to reduce the costs and the vertical overall dimensions of the machine, as compared with equivalent machines of the known type.

As can be understood from the description, it is fully evident that such a lateral arrangement of the conveyor belt is posssible because of the installation of said transversal auger.

It also evident that, according to the type of use or to the particular requirements of the user, the conveyor belt can be applied either on the right-hand side or on the left-hand side of the road scarifying machine or, eventually, on both of them. In this last case, it will be necessary to install two augers which discharge in directions opposite to one another.

Whether the machine is equipped with or a conveyor belt or not, the transversal auger can have its discharging side either on the right or on the left, or alternatively, the augers can be two in number and discharge on sides opposite to one another.

On the basis of what has been described, it is easy to understand that the road scarifying machine according to the invention achieves all the proposed purposes.

The presence of the auger, in fact, permits to immediately clear the working area from the debris resulting from the crushing at the same time as it is produced, thus making it possible to continue immediately the digging or asphalt covering operations in the working area. Moreover, the pile-up of the crushed material on the sides of the working area, permits, as has already been said, its subsequent recovery and re-use.

Should the machine also be provided with a conveyor belt, the material collected by the auger is conveyed to the conveyor belt which sends it into a means of transportation.

It is pointed out that the machine according to the invention can be obtained in any dimensions and shapes and it can be equipped with milling drums having any diameter and any width, suited to work on road surfacings of any extent.

Moreover, the means for conveying the debris resulting from the crushing on to the conveyor belt can also differ from the described auger and can consist, for instance, of one or more conveyor belts, or of two or more chains or other means, regardless of their arrangement in relation to the frame of the machine and in relation to the conveyor belt itself.

The mentioned modifications and others which may concern different embodiments of the conveyor belt or of the conveyance means from the milling drum to the conveyor belt itself, or different embodiments and different positions between conveyor belt and conveyance means co-operating with it, must all fall within the spirit and scope of the present invention.

Claims

1. A road scarifying machine (1) for road surfacings comprising:

   - a frame (2) mounted on wheels (3) which supports at least one driving unit (4) and at least one driver's seat (5);

- a milling drum (6) connected to said frame (2) and mechanically connected to power means suited to drive it into rotation in order to crush said road surfacing (7) with which it comes into contact,

characterized in that it is provided with conveyance means (9) arranged essentially transversal in relation to said frame (2), suited to discharge on the side of the road scarifying machine (1) and off the working area (72) of the milling drum (6) the debris (71) resulting from the crushing of the road surfacing (7), which is loaded into them by a centrifugal force because of the rotation of said milling drum (6).

2. A road scarifying machine (1) according to claim 1, characterized in that said conveyance means consist of at least one rotating auger (9) arranged adjacent to said milling drum (6) and lodged inside a collecting channel (91) connected to said frame (2) of said road scarifying machine (1), said collecting channel (91) being suited to receive said debris (71) removed by said milling drum (6).

3. A road scarifying machine (1) according to claim 2, characterized in that said rotating auger (9) is transversally arranged in relation to said frame (2), and is slanted from bottom-to-top according to the direction of progress of the debris (71) along the auger (9) itself.

4. A road scarifying machine (1) according to claim 1, characterized in that it is provided with a conveyor belt (10) arranged laterally in relation to said frame (2) of said machine, said conveyor belt (10) being positioned in correspondence with the terminal part of said conveyance means (9) and underneath them, suited to receive the debris (71) conveyed by said conveyance means (9).

5. A road scarifying machine (1) according to claim 4, characterized in that said conveyor belt (10) is connected to one of the sides of said frame (2) through pivoting means, said pivoting means being suited to permit the projection of said conveyor belt (10) on an essentially horizontal plane.

6. A road scarifying machine (1) according to claim 4 or 5, characterized in that said conveyor belt (10) presents its terminal part (101) which can be bent, the length (17) of said bent conveyor belt being essentially equal to the length (14) of said road scarifying machine (1).

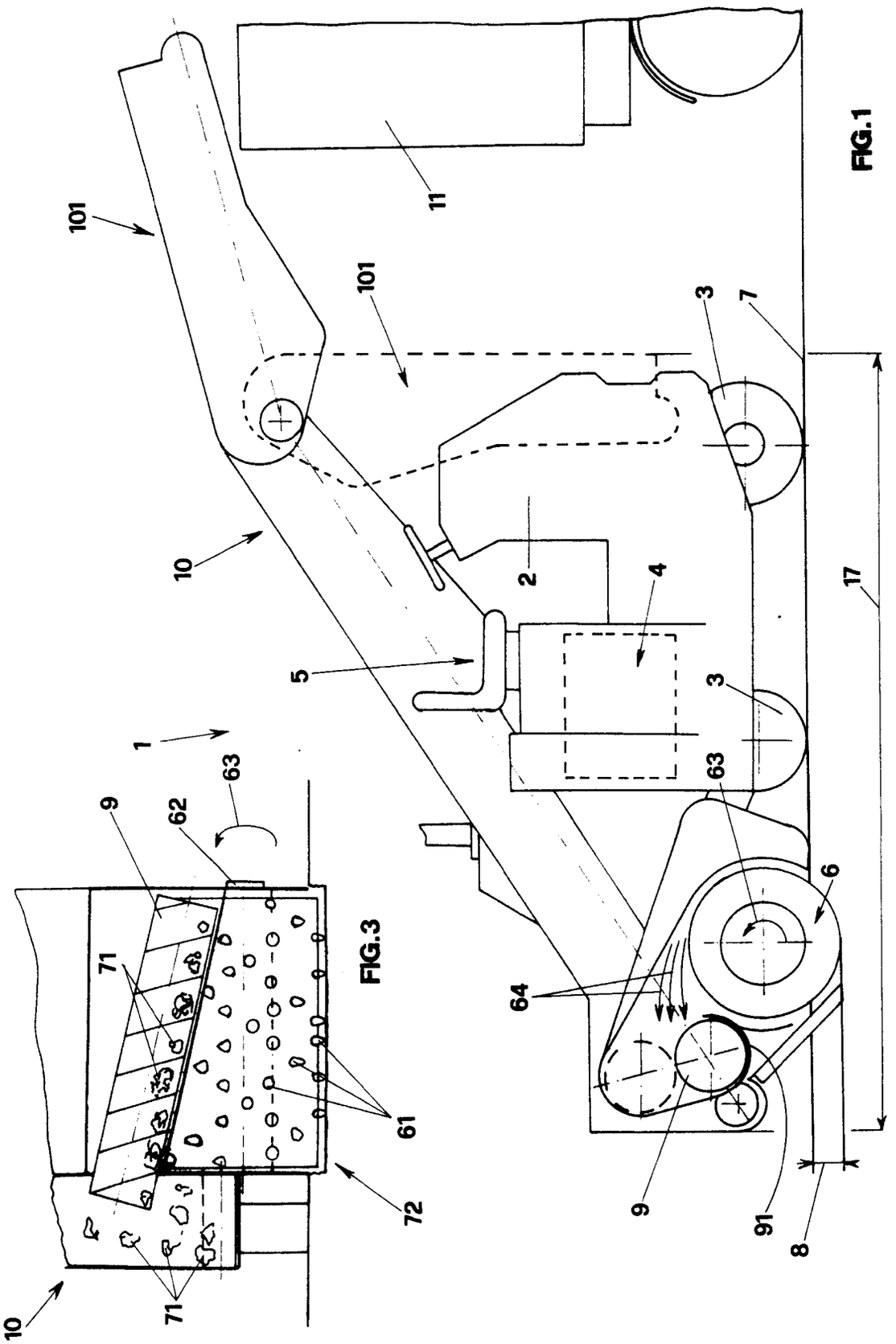

FIG.1

FIG.3

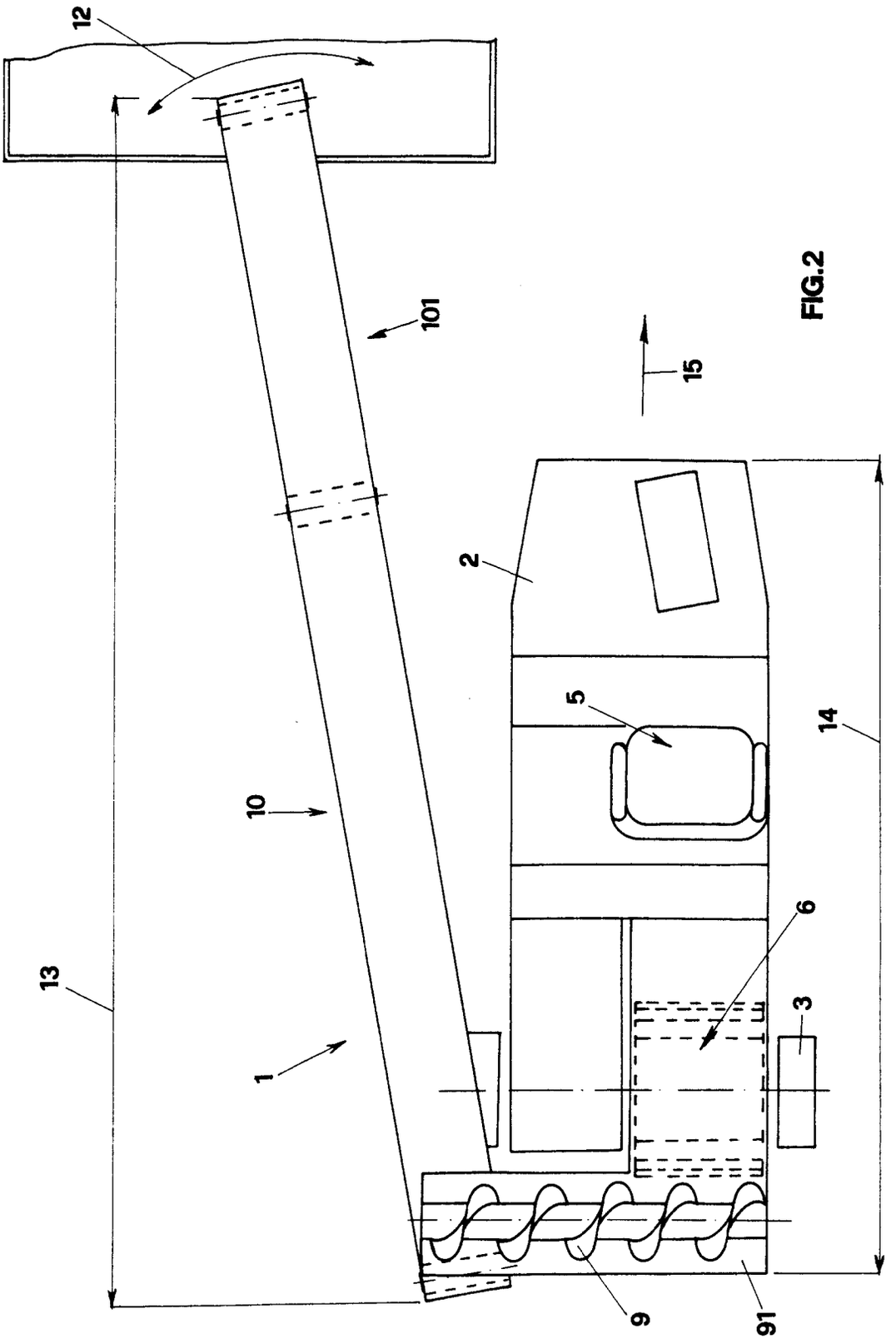

FIG.2