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(54) Method and vehicle of forming a synthetic grass field, stencil, lining means and a synthetic mat.

(57) The invention relates to a method of forming a synthetic grass field in which a synthetic mat (3a) is applied and strewn in with sand, during the application of the synthetic mat (3a). In this manner the synthetic mat (3a) to be applied is strewn in to the desired filling degree, whilst after the application the mat (3a) may become wet without resulting in disadvantageous effects.

The invention relates further to a vehicle (7) of applying a synthetic mat (3a) for forming a synthetic grass field and to a stencil for applying a lining pattern to a synthetic mat (3a) of a synthetic grass field.

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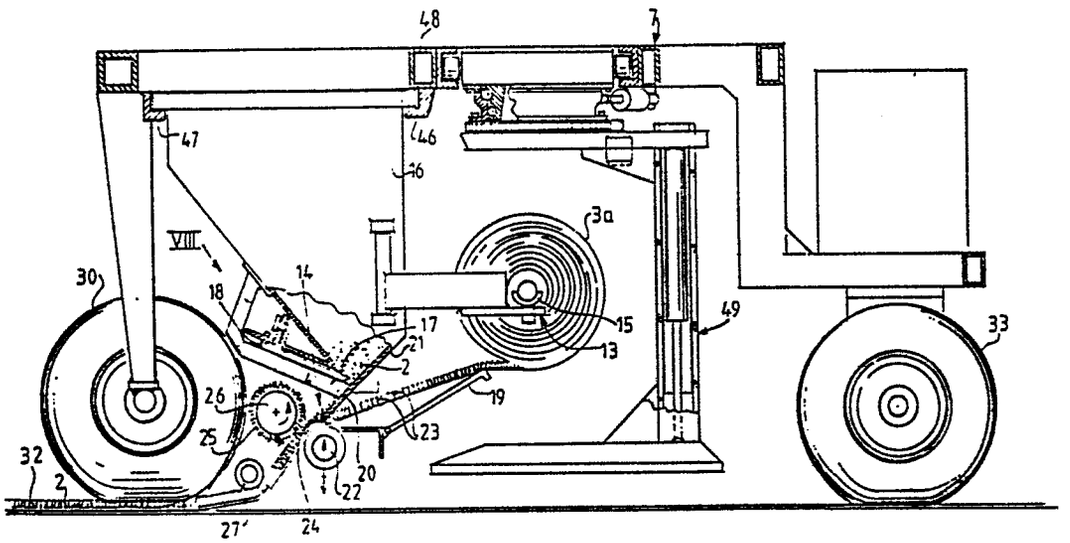
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FIG.3

Method and vehicle of forming a synthetic grass field, stencil, lining means and a synthetic mat.

The invention relates to a method of forming a synthetic grass field in which a synthetic mat is applied and strewn in with sand.

This known method is particularly weather sensitive because, the sythetic mat should be as dry as possible when strewn in with sand. If after application the synthetic mat becomes wet, it takes a long time, for example at least one week before the mat is sufficiently dry before strewing in is possible. A synthetic mat, when strewn in with sand, should be as dry as possible, because otherwise the filling degree obtained is not sufficient. The filling degree amounts to about 80 to 100%.

Covering a synthetic mat with a synthetic resin foil for protecting it against weather influences such as rain, hail or snow does not provide a satisfactory result because water vapour condenses from the subsoil against the synthetic resin foil and the resulting condensation drops wet the synthetic mat.

The invention has for its object to improve the method set forth in the preamble in a sense such that it becomes insensitive to weather influences to a great extend. According to the invention this is achieved by strewing in sand during the application of the synthetic mat. In this manner the synthetic mat to be applied is strewn in to the desired filling degree, whilst after the application the mat may become wet without resulting in disadvantageous effects.

When till after strewing in the synthetic mat with sand this synthetic mat and the sand are screened against weather influences it is even possible to apply the synthetic mat during a shower and to strew in the sand.

When during strewing in the sand the poles of the synthetic mat are turned over a gap is formed along the width of the synthetic mat between the upright and turned over poles so that fast and efficiently the desired filling degree of sand can be obtained.

During experiments it has been found that various synthetic mats to be used have mutual different sizes so that they have to be adapted to one another. This is preferably achieved by adapting prior to the application of a synthetic mat this synthetic mat to another mat which is adjacent in the synthetic grass field being formed.

When prior to the application of a synthetic mat it is provided with a lining pattern part associated with a lining pattern of the synthetic grass field the mat provided with the lining pattern can be directly applied and strewn in whilst it is avoided that after application and strewing in on the places where a lining pattern has to be applied sand has to be removed out of the mat.

When the lining pattern part is applied by removing a strip of poles from a sublayer of the synthetic mat and by subsequently applying a synthetic mat strip, the thickness of which is substantially equal to the height of the removed poles, a lining pattern is obtained which is firmly connected with the synthetic mat, whilst by non-interruption and/or by minimizing as much as possible the affection of

the substrate of the synthetic mat, the rigidity of the synthetic mat is maintained and no displacement with respect to the substrate can occur.

Preferably the strip of poles is removed by local heating, for example, by means of a heated filament. The use of a filament is preferred over the use of cooperating knives, between which the poles can get entangled, whilst such a structure, for example, in the form of hair-clippers is relatively expensive.

When prior to the application of a synthetic mat it is provided at least along one edge with an adhesive strip an adjacent synthetic mat to be applied can be simply and rapidly coupled with a synthetic mat already applied by gluing to the adhesive strip.

In order to avoid that after the application of a glue the effect thereof is diminished because the sand to be strewn in fixes to the glue, it is preferred that during the application of the synthetic mat a synthetic mat strip of the synthetic mat is kept free from sand.

In order to avoid a second strewing in operation it is preferred that the synthetic mat strip adjacent the adhesive strip is strewn in with sand after gluing another synthetic mat to the adhesive strip.

The invention relates further to a vehicle of applying a synthetic mat for forming a synthetic grass field. This vehicle is characterized by means for carrying the synthetic mat and in the direction of movement of the synthetic mat to be applied downstream the application means means for strewing in sand during the application of the synthetic mat.

When in the path of movement of the synthetic mat to be applied at least one vehicle wheel is arranged downstream the strewing in means the vehicle wheel runs over the applied, sand strewn synthetic mat so that owing to a so-called plate effect of the strewn mat the vehicle wheel does not produce traces in the synthetic mat.

When a number of vehicle wheels is arranged downstream the strewing in means and at least on one side a vehicle

wheel is arranged on a separate wheel axle which is releasably fastened to the vehicle, the weight of the entire vehicle including the quantity of sand to be strewn and the mat to be applied is transferred over a maximum number of wheels to the ground so that the overall pressure per wheel remains as low as possible, whist by removing at least one vehicle wheel on at least one side the overall width of the vehicle can remain limited to the maximum width prescribed for transport in containers.

When in the path of movement of the synthetic mat to be applied downstream of the strewing in means there is arranged a pressure shaft bent rearwardly curved from the middle towards longitudinal edges of the synthetic mat, folds occurring during application and/or strewing can be removed before the synthetic mat has attained its definite place.

Since the strewing means operate substantially throughout the entire width of the synthetic mat it is preferred that the strewing in means are removably fastened to the vehicle so that they do not impose either a limitation to a minimum width of the vehicle.

When the vehicle comprises lifting means for the vehicle which are rotatably and/or displaceably transversely of the direction of movement of the vehicle fastened thereto a synthetic mat can be fastened on the one hand at a correct place to the lifted vehicle, whilst on the other hand the vehicle can be turned on the play ground without steering vehicle wheels so that formation of traces in the synthetic grass field is avoided.

When the application means and the strewing in means are screened against weather influences it is also possible to deposit a sand strewn synthetic mat during a rain or hail shower.

A further aspect of the invention relates to a stencil for applying a lining pattern to a synthetic mat of a synthetic grass field. This stencil is characterized by two rails, a carriage movable along the rails provided with gui-

des standing at right angles to the rails for a lorry carrying lining means.

When the lining means are arranged in a frame rotatably arranged on the lorry it is also possible to apply a curved lining pattern.

In a single operation the stencil permits the application of a lining pattern when the lining means comprise a shaving member for cutting the poles of the synthetic mat, means for removing the shaved poles, a gluing member and means for applying a synthetic mat strip.

Finally the invention relates to the lining means as well as to a synthetic mat to be applied and provide at a longitudinal edge with an adhesive strip and, if desired, a place label indicating its order of succession with respect to adjacent synthetic mats.

The aforesaid and further features will be elucidated with respect to a non-limitative example of an embodiment shown in the accompanying drawing.

The drawing shows in:

Fig. 1 a perspective view of a method of applying a mat of synthetic grass with the aid of a vehicle embodying the invention;

Fig. 2 an enlarged perspective view of detail II of fig. 1;

Fig. 3 an elevational, partially a sectional view taken on the line III-III in fig. 2;

Fig. 4 an elevational view corresponding to fig. 3, the vehicle being elevated from a substrate with the aid of lifting means;

Fig. 5 an elevational view of the vehicle corresponding to fig. 2, the various detachable elements of which are removed;

Fig. 6 a perspective view of the strewing means removed from the vehicle;

Fig. 7 a perspective view of the removed additional strewing means;

Fig. 8 on an enlarged scale detail VIII of fig. 3;

Fig. 9 a perspective view of the stencil arranged in a shed for applying a lining pattern to a synthetic mat;

Fig. 10 an enlarged perspective view of detail X of fig. 9; and

Fig. 11 on another scale a perspective view of detail XI of fig. 10.

Fig. 1 shows a synthetic mat 1 of grass built up from synthetic mats 3 strewn in with sand 2, a number of which is provided with a lining pattern 4.

The synthetic mats 3a to be applied, screened against weather influences, are supplied in a container 5 and the dried sand 2 is supplied in a closed loading trough 6 or in bags.

The synthetic mats 3a are applied with the aid of a vehicle 7 on a substrate 8 and during the application of the synthetic mat 3a it is strewn in with sand 2. The vehicle 7 is accurately guided along the substrate 8 with the aid of a laser transmitter 9, a laser receiver 10 arranged on the opposite side of the synthetic mat 1 and a laser receiver 11 disposed on the vehicle.

The synthetic grass field 1 has a length of about 100 ms and a width of about 80 ms. The synthetic mat is formed by a frame of synthetic mats 3, which is subsequently completed with further synthetic mats 3. The synthetic mats may have a width of 4 ms and a length of 36 ms. Altough in the application of the synthetic mat 3a the vehicle 7 has a width of at least 4 ms, it can pass in a simple manner through an access gate 2, because by removing a number of vehicle elements in a manner to be described hereinafter the width of the vehicle can be reduced to dimensions prescribed for road transport or transport in a container.

After all synthetic mats 3a have been applied with the aid of the vehicle 7, the synthetic mat 1 is, in principle, directly playable.

Figs. 2 and 3 show further in detail the vehicle 7 embodying the invention, which is employed in applying a synthetic mat for laying out a synthetic mat 3a, which is

wound in this case. The vehicle 7 comprises means 13 carrying the synthetic mat 3a and furthermore means 14 located in the path of movement of the synthetic mat 3 downstream the applying means 14 for strewing sand into the synthetic mat 3a during the application. The applying means 13 comprise bearers 15 for a shaft 116, on which the synthetic mat 3a is wound.

The strewing means 14 comprise a container 16 for sand 2, which is provided on the underside with a longitudinal gap 17, the passage of which is adjustable by means of a controllable slide 18.

From the applying means 13 the synthetic mat 3a moves along a pivotable plate 19 and below a smoothing member 20, which is arranged upstream the strewing means 14, forming a prolonged part of a wall 21 of the holder 16. A roller 22 is arranged at such a distance from the smoothing member 20 that the smoothing member turns over the poles 23 of the synthetic mat 3a at the strewing means 14. In this manner the sand can rapidly and substantially completely fill a gap 24 thus formed, so that mainly the desired degree of filling is directly obtained with the sand 2, which flows down along the doctor 20 after having passed of the slide 18. As the case may be, redundant sand 2 can be brushed away with the aid of a roller 26 provided with a brush 25, the roller rotating opposite the direction of movement of the synthetic mat 3a to be wound out.

Downstream the strewing means 14 there is provided a pressure shaft 27 formed by two shafts 27 curved from the middle of the synthetic mat 3a towards the longitudinal edges 28 and 29. Any folds and the like can thus be smoothed away.

The rear wheels 30 and 31 of the vehicle run on the deposited part 32 of the synthetic mat 3a strewn in with sand 2. By this arrangement it is furthermore achieved that additional means for winding off the wound synthetic mat 3a can be dispensed with.

Steering the vehicle 7 during the application of the

synthetic mat 3a occurs by the action of the laser means 9, 10 and 11 in a hydraulic manner by means (not shown). Steering corrections can be performed by turning the front wheels 33, so that a longitudinal edge 28 will satisfactorily adjoin a synthetic mat 3 already applied. The synthetic mat 3a is fastened with the aid of glue 34 to the synthetic mat 3. For this purpose the vehicle 7 is provided with a glue sole 35, which applies glue from a holder 36 to an adhesive strip 37 of the synthetic mat 3. With the aid of a pressure roller 38 the synthetic mat strip 39 is pressed against the adhesive strip 37 provided with the glue 34. Subsequently with the aid of additional strewing means 40 the synthetic mat strip 39 of the synthetic mat 3a and the synthetic mat strip 41 of the synthetic mat 3, both strips being so far held free of sand, are strewn in with the sand 2. In this manner it is avoided that the sticking force of the glue 34 on the adhesive strip 37 should be reduced by receiving sand 2. On the longitudinal edge 29 the applied synthetic mat 3a also has a strip 41 which is held free of sand 2.

In order to withstand weather influences as far as possible both the strewing means 14 and the applying means 13 are covered by a screen 42 indicated by dot-and-dash lines. The units 43, 44 and 45 comprise respectively the driving means for the vehicle, the hydraulic tank and the steering means of the vehicle 7. In order to be able, in winding out the synthetic mat 3a, to adjust its position in the longitudinal direction of the holder 16, a carrier 15a arranged between the pivot 120 fastened to the holder 16 is rotatably journalled a spindle shaft 123 provided with a handle 122 and being helically connected with a mother 124 attached to the carrier 15a. In this manner accurate positioning of the synthetic mat 3a can take place without turning the vehicle wheels.

Fig. 3 clearly shows that the sand holder 16 is displaceably arranged in guiding means 46, 47 so that the holder 16 can be releasably fastened to a frame 48 of the ve-

hicle 7.

The vehicle 7 is furthermore provided with lifting means 49. The lifting means 49 comprises a leg 51 formed by a cylinder 52 guided around a hydraulic piston 54 fastened to a supporting piece 53, the piston rod 155 of which is fastened to the foot 50 of the leg 51. By actuating the hydraulic piston 54 the vehicle with its wheels 30, 31 and 33 can be lifted from the ground, whilst the whole assembly bears on a substrate 55 via the foot 50.

The supporting piece 53 is connected trough a rotatably crown 56 with the frame 48. By actuating an engine 157 the vehicle can be turned as a whole when the vehicle wheels 30, 31 and 33 are lifted. Moreover, in the position of the vehicle 7 shown in fig. 4, it is possible to guide a synthetic mat 3a on the plate 19 and on the one hand between the roller 22 and on the other hand between the doctor 20 and the roller 26 and subsequently below the pressure shaft 27 and the vehicle wheels 30 and 31, whilst, for example, one end 57 fastened to an adhesive strip 59 of a synthetic mat 3 is provided with glue 58. After lowering the vehicle 7 the deposition and simultaneous sand strewing of the synthetic mat 3a can directly start.

The lifting means 40 including the rotatably crown 56 can be displaced with the aid of a carriage 60 provided with rollers 61 by energizing a hydraulic cylinder 62 transversely of the direction of movement of the vehicle 7 and fastened to the frame 48. The rollers 61 run in U-shaped profiles 63.

Figs. 5, 6 and 7 show the vehicle parts 7a, 7b and 7c for building the vehicle 7 whilst in praticular the vehicle part 7a has a width b smaller than the maximum width prescribed for road and container transport. The vehicle part 7b comprising mainly strewing means 14 and applying means 13 can be shifted from the guiding means 46, 47 with the aid of a rod 64 carried by a vehicle not shown, the rod 64 being passed through a passage 65 in the holder 16 and being supported in a yoke 66 fastened to the holder 16. Before sli-

ding out the vehicle part 7b in the direction of the arrow 166, it is necessary to remove the vehicle wheel 31 on one side, which can be carried out in a simple manner, because this vehicle wheel 31 is arranged on a separate wheel axle 67 which is releasably fastened via a support 68 with the aid of fixing means 69 to the trough 16.

Fig. 8 shows more in detail the construction of the slide 18 for controlling the width of the gap 17. The slide 18 is provided with pins 70 arranged in and co-operating with a slot hole 71 in an angular profile 72, which is displaceable with the aid of hydraulic means (not shown) in the direction of the double arrow 73. Owing to the inclined position of the slot hole 71 with respect to the direction of movement indicated by the arrow 73 a fine control of the slide 18 is obtained.

Fig. 9 shows a stencil 75 arranged in a shed 74, by means of which on the one hand a synthetic mat 3b can be adapted to another synthetic mat adjacent the synthetic mat 1 to be applied and on the other hand a lining pattern 4 can be arranged. The stencil comprises two relatively parallel rails 76, a carriage 77 movable along the rails 76 provided with guides 78 standing at right angles to the rails 76 for a lorry 79. The synthetic mat 3b is applied to a supporting beam 80 and subsequently redundant material 81 is removed. The a synthetic mat 82 adjacent the play field 1 to be provided is laid against the synthetic mat 3b and the synthetic mat 82 is adapted to the synthetic mat 3b.

If necessary a lining pattern 4 is applied to the synthetic mat 3b with the aid of the lining means 83 carried by the lorry. Finally an adhesive strip 37 is arranged on the longitudinal edge 29. The ready synthetic mat 3b is subsequently wound up and arranged in a roller carrier 84 and provided with a label 85 which unambiguously indicates the place of the synthetic mat 3a within the synthetic grass field 1. If desired the wound synthetic mats 3a are provided with an envelope 86 and arranged in the container 5 which is transported to the building site.

Fig. 10 shows more in detail the lorry 79. The lorry 79 carries the lining means 83 arranged on a frame 87, which is rotatable on a ring 88 of the lorry 79. The lining means 83 comprise, in order of succession in the working direction in arranging the lining pattern 4 in the synthetic mat 3b a shaving member 89 provided with electric connections 90 for electrically heating a wire or a rod 91. The rod 91 is inserted through such a depth into the synthetic mat 3b that with the aid of the hot rod 91 the poles 92 are removed from a sublayer 93 of the synthetic mat 3b and then carried away with a delivery device 94 indicated by dot-and-dash lines. With the aid of a roll 95 the depth of insertion of the shaving member 89 can mainly be adjusted. The shaving member 89 is subjected to the tension of a spring (not shown) working towards the synthetic mat 3b.

The shaved synthetic mat 3b is then provided from a glue holder 96 with a glue 97, to which an synthetic mat strip 98 is applied. The thickness of the synthetic mat strip 98 is subsequently equal to the height of the removed poles 92. By means of the pressure roller 99 the applied strip 98 is pressed down in its place.

With the aid of the members 100 poles 101 adjacent the shaved part of the synthetic mat 3b are bent away therefrom so that between the sublayer 93 and the synthetic mat strip 98 no poles 101 can get.

The shaving member 89, the glue holder 96 and the pressure roller 99 are each fastened to profiles 102 by which the height with respect to the synthetic mat 3b to be treated can be adjusted.

Claims

1. A method of forming a synthetic grass field in which a synthetic mat is applied and strewn in with sand characterized in that during the application of the synthetic mat it is strewn in with sand.

2. A method as claimed in claim 1 characterized in that till after strewing in the synthetic mat with sand this synthetic mat and the sand are screened against weather influences.

3. A method as claimed in claim 1 or 2 characterized in that during strewing in the sand the poles of the synthetic mat are turned over.

4. A method as claimed in any of the preceding claims characterized in that prior to the application of a synthetic mat it is adapted to another mat which is adjacent in the synthetic grass field being formed.

5. A method as claimed in any of the preceding claims characterized in that prior to the application of a synthetic mat it is provided with a lining pattern part associated with a lining pattern of the synthetic grass field.

6. A method as claimed in claim 5 characterized in

that the lining pattern part is applied by removing a strip of poles from a sublayer of the synthetic mat and by subsequently applying a synthetic mat strip, the thickness of which is substantially equal to the height of the removed poles.

7. A method as claimed in claim 6 characterized in that by local heating, for example, by means of a heated filament the strip of poles is removed.

8. A method as claimed in any of the preceding claims characterized in that prior to the application of a synthetic mat it is provided at least along one edge with an adhesive strip.

9. A method as claimed in claim 8 characterized in that during the application of the synthetic mat an adhesive strip of an adjacent applied synthetic mat is provided with glue and the synthetic mat which is to be applied is glued to the applied synthetic mat.

10. A method as claimed in claim 8 or 9 characterized in that during the application of the synthetic mat a synthetic mat strip of the synthetic mat is kept free from sand.

11. A method as claimed in claim 10 characterized in that the synthetic mat strip adjacent the adhesive strip is strewn in with sand after gluing another synthetic mat to the adhesive strip.

12. A vehicle of applying a synthetic mat for forming a synthetic grass field characterized by means for carrying the synthetic mat to be applied and in the direction of movement of the synthetic mat to be applied downstream the application means means for strewing in sand during the application of the synthetic mat.

13. A vehicle as claimed in claim 12 characterized in that the application means comprise bearers for a synthetic mat coil.

14. A vehicle as claimed in claim 12 or 13 characterized in that the strewing in means comprise a sand container.

15. A vehicle as claimed in claims 12 to 14 charac-

terized in that the path of movement of the synthetic mat to be applied a smoothing member is arranged upstream the strewing in means.

16. A vehicle as claimed in claims 12 to 15 characterized in that in the path of movement of the synthetic mat to be applied at least one vehicle wheel is arranged downstream the strewing in means.

17. A vehicle as claimed in claim 16 characterized in that a number of vehicle wheels is arranged downstream the strewing in means and at least on one side a vehicle wheel is arranged on a separate wheel axle which is releasably fastened to the vehicle.

18. A vehicle as claimed in claims 12 to 17 characterized in that in the path of movement of the synthetic mat to be applied downstream of the strewing in means there is arranged a pressure shaft bent rearwardly curved from the middle towards longitudinal edges of the synthetic mat.

19. A vehicle as claimed in claims 12 to 18 characterized in that the strewing in means are removably fastened to the vehicle.

20. A vehicle as claimed in claims 12 to 19 characterized by lifting means for the vehicle which are rotatably and/or displaceably transversely to the direction of movement of the vehicle fastened thereto.

21. A vehicle as claimed in claims 12 to 20 characterized by means for gluing the synthetic mat to be applied to a glue strip of an adjacent synthetic mat deposited.

22. A vehicle as claimed in claim 21 characterized in that dosing means comprised in the strewing in means are located within edge strips of the synthetic mat.

23. A vehicle as claimed in claim 21 or 22 characterized in that in the direction of movement of the vehicle strewing in means are arranged downstream the gluing means.

24. A vehicle as claimed in claims 12 to 23 characterized in that the application means and the strewing in means are screened against weather influences.

25. A stencil for applying a lining pattern to a syn-

thetic mat of a synthetic grass field characterized by two rails, a carriage movable along the rails provided with guides standing at right angles to the rails for a lorry carrying lining means.

26. A stencil as claimed in claim 25 characterized in that the lining means are arranged in a frame which is rotatably arranged on the lorry.

27. A stencil as claimed in claim 25 or 26 characterized in that the lining means comprise a shaving member for cutting the poles of the synthetic mat, means for removing the shaved poles, a gluing member and means for applying a synthetic mat strip.

28. A stencil as claimed in claim 27 characterized in that the shaving member comprises an electrically heatable wire.

29. A stencil as claimed in claims 25 to 28 characterized in that the distance between the rails is substantially equal to at least the width of two adjacent synthetical mats.

30. Lining means as claimed in claim 27 or 28.

31. A synthetic mat to be applied provided at a longitudinal edge with an adhesive strip and, if desired a place lable.

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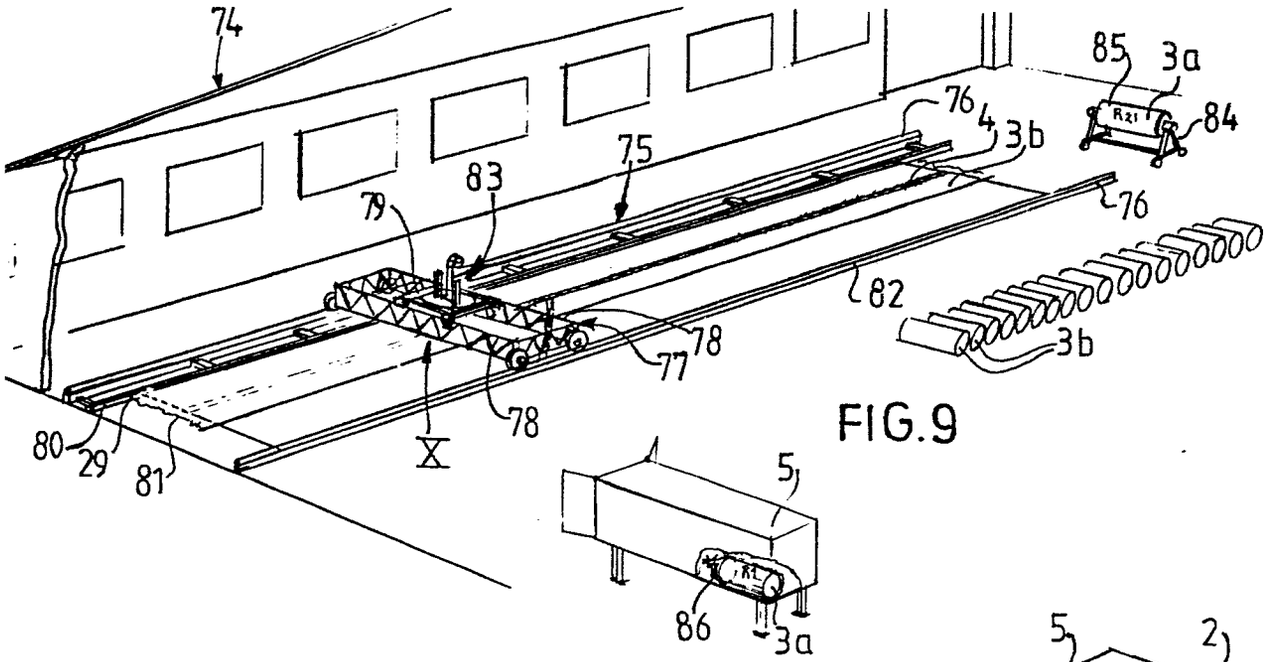

FIG.9

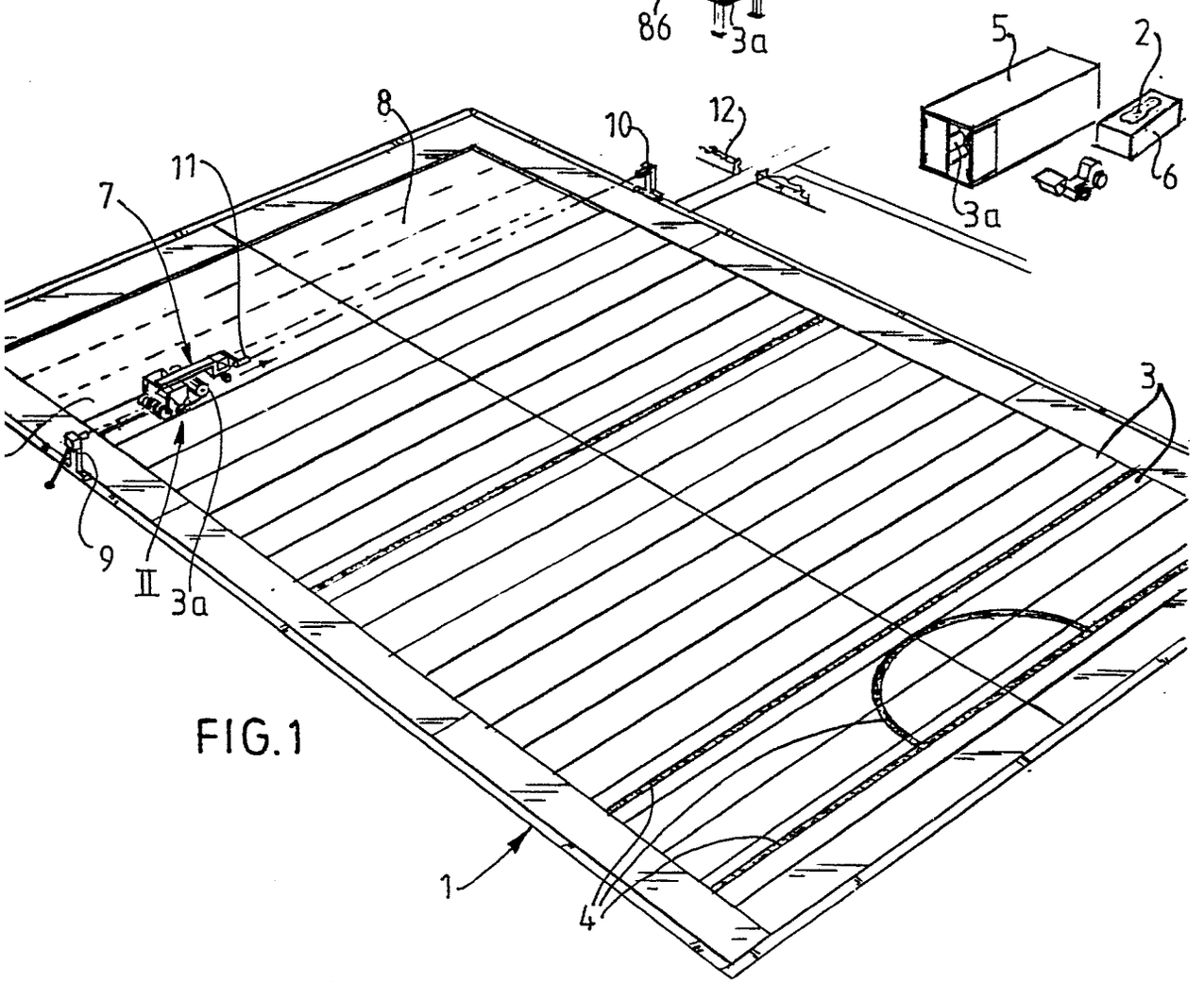

FIG.1

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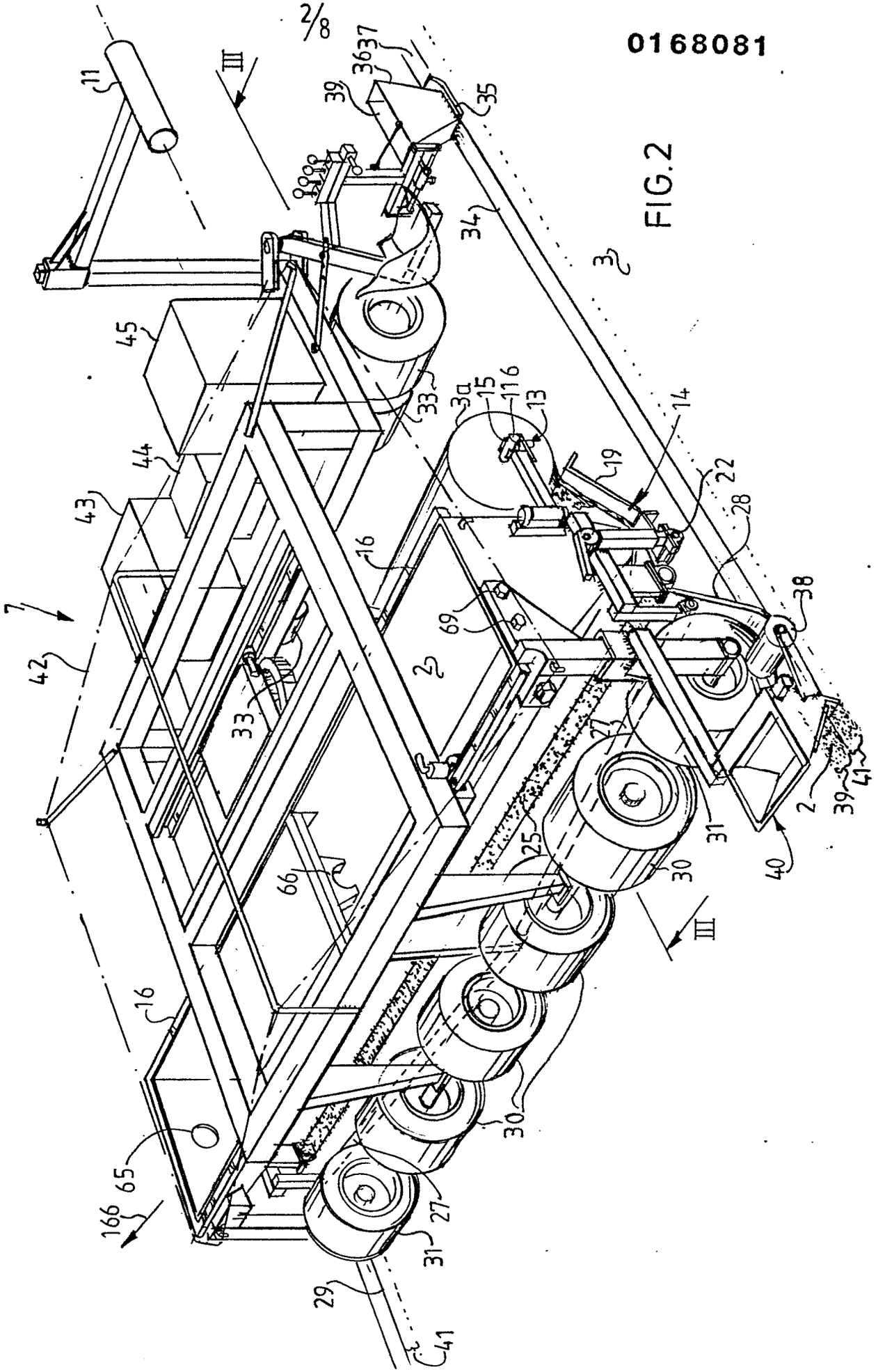

FIG.2

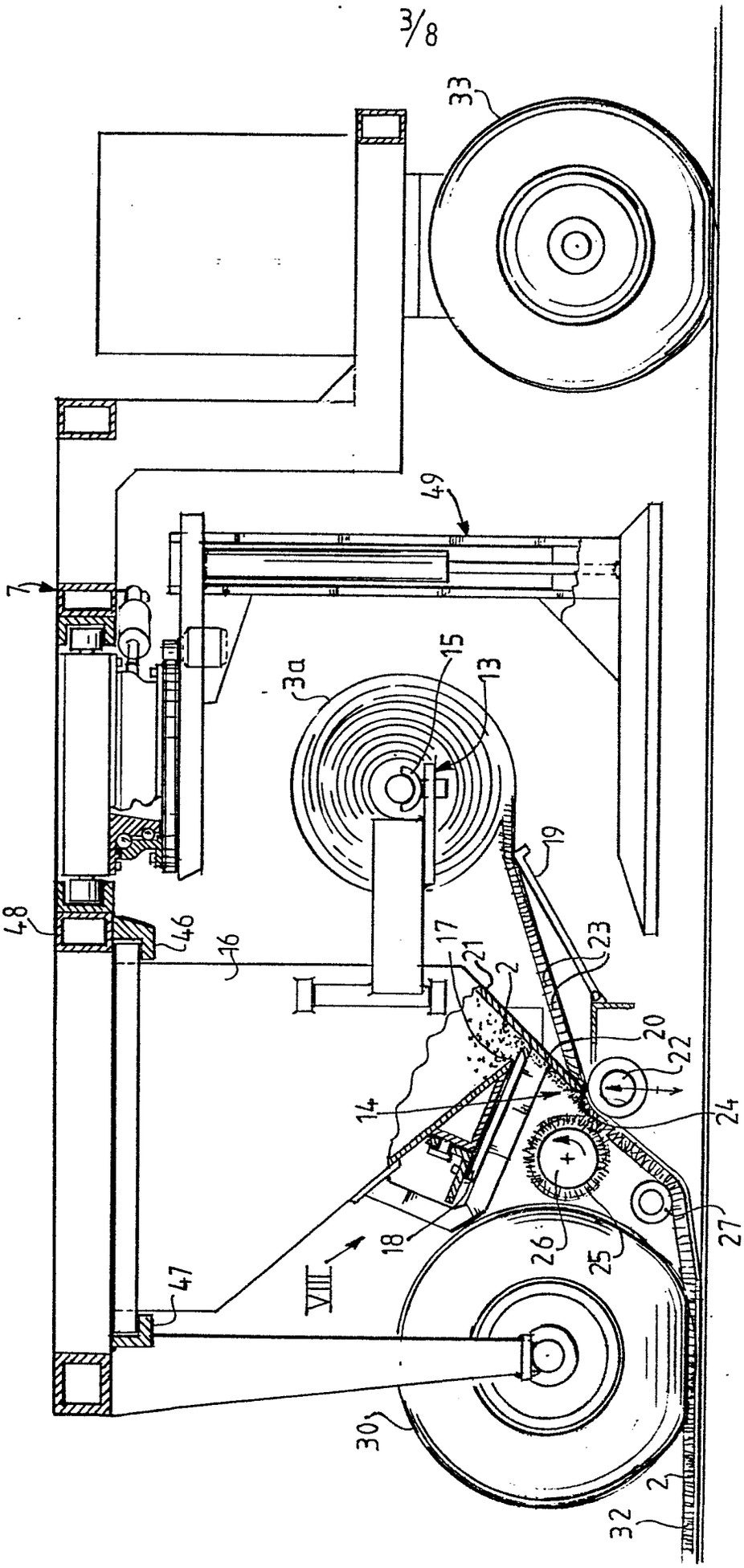
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FIG.3

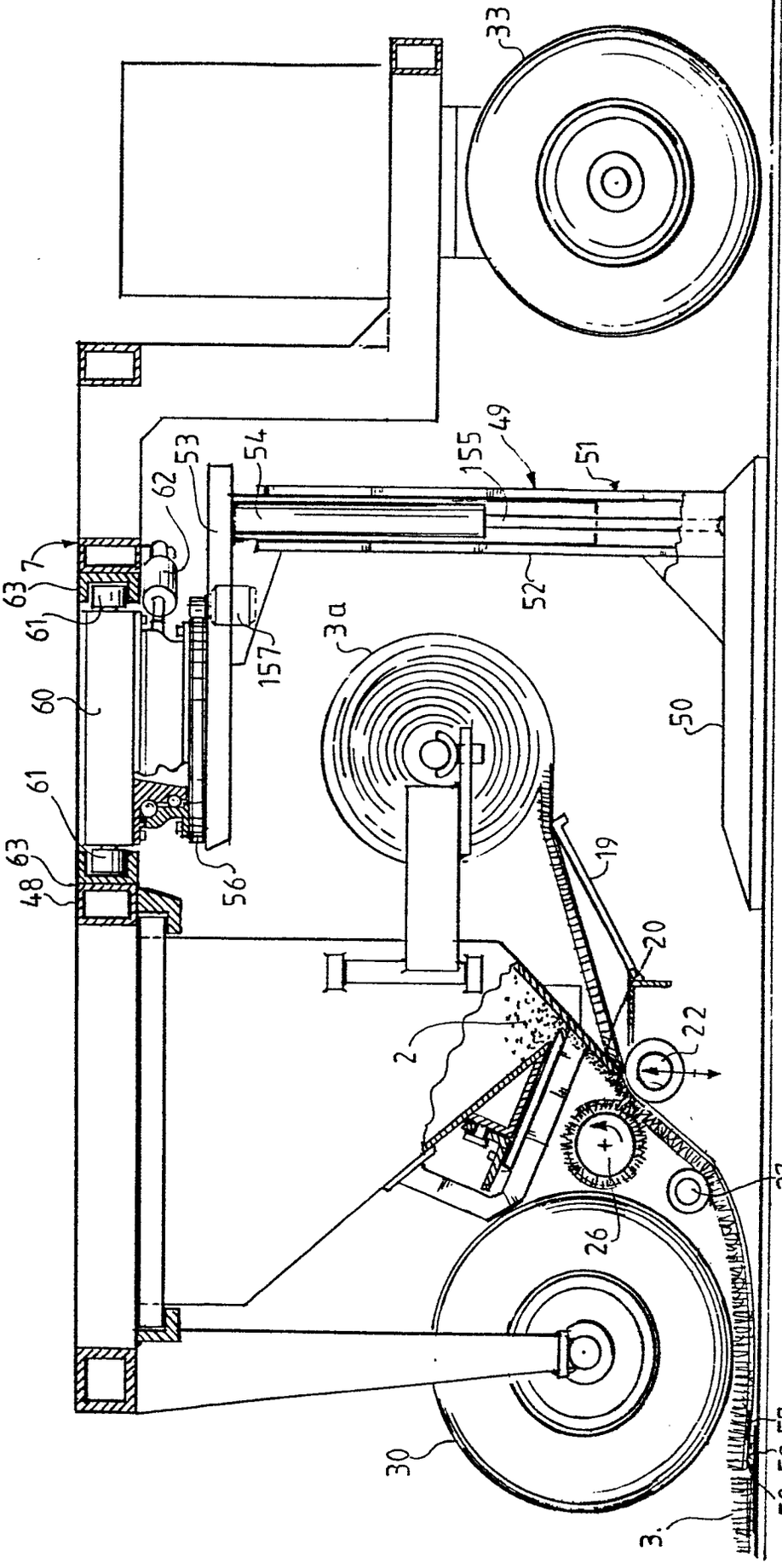
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FIG. 4

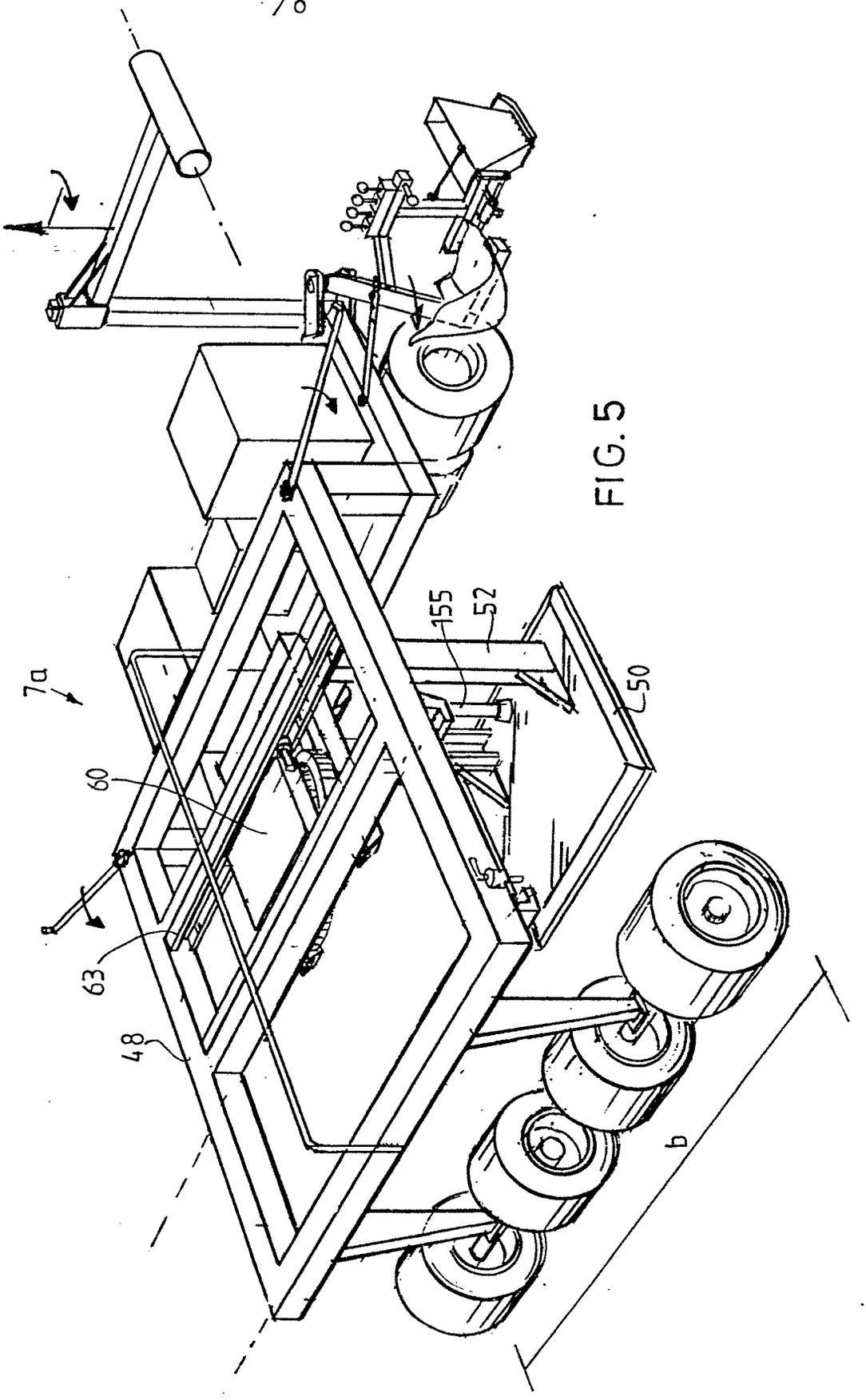

FIG.5

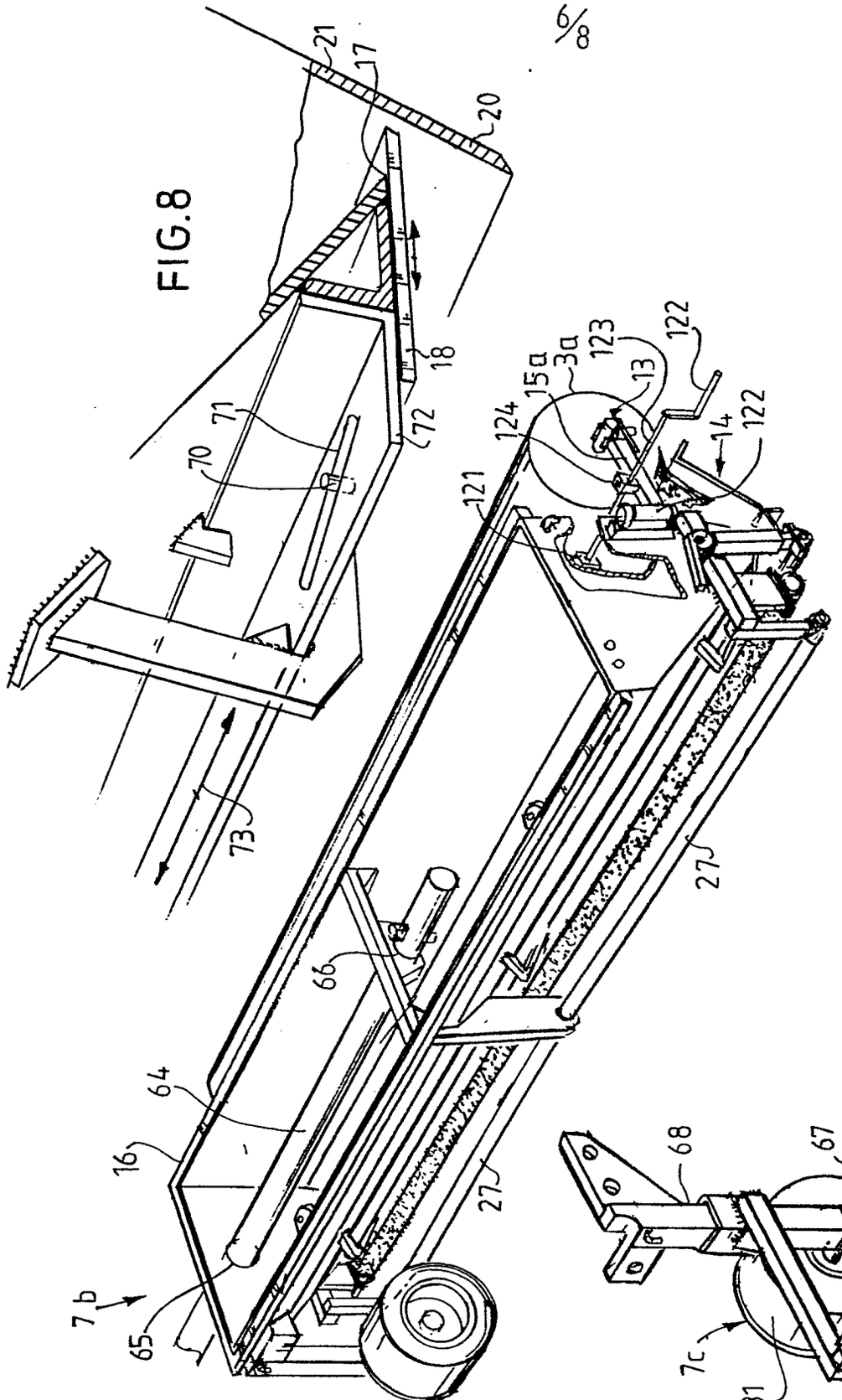

FIG.6

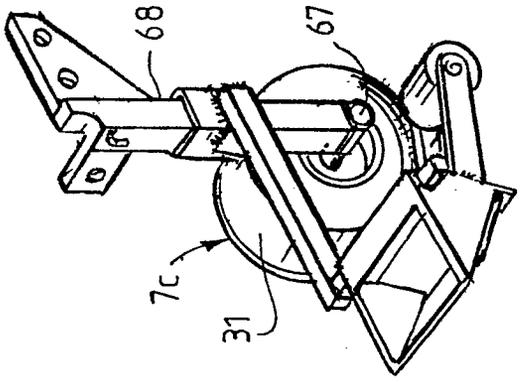

FIG.7

FIG.8

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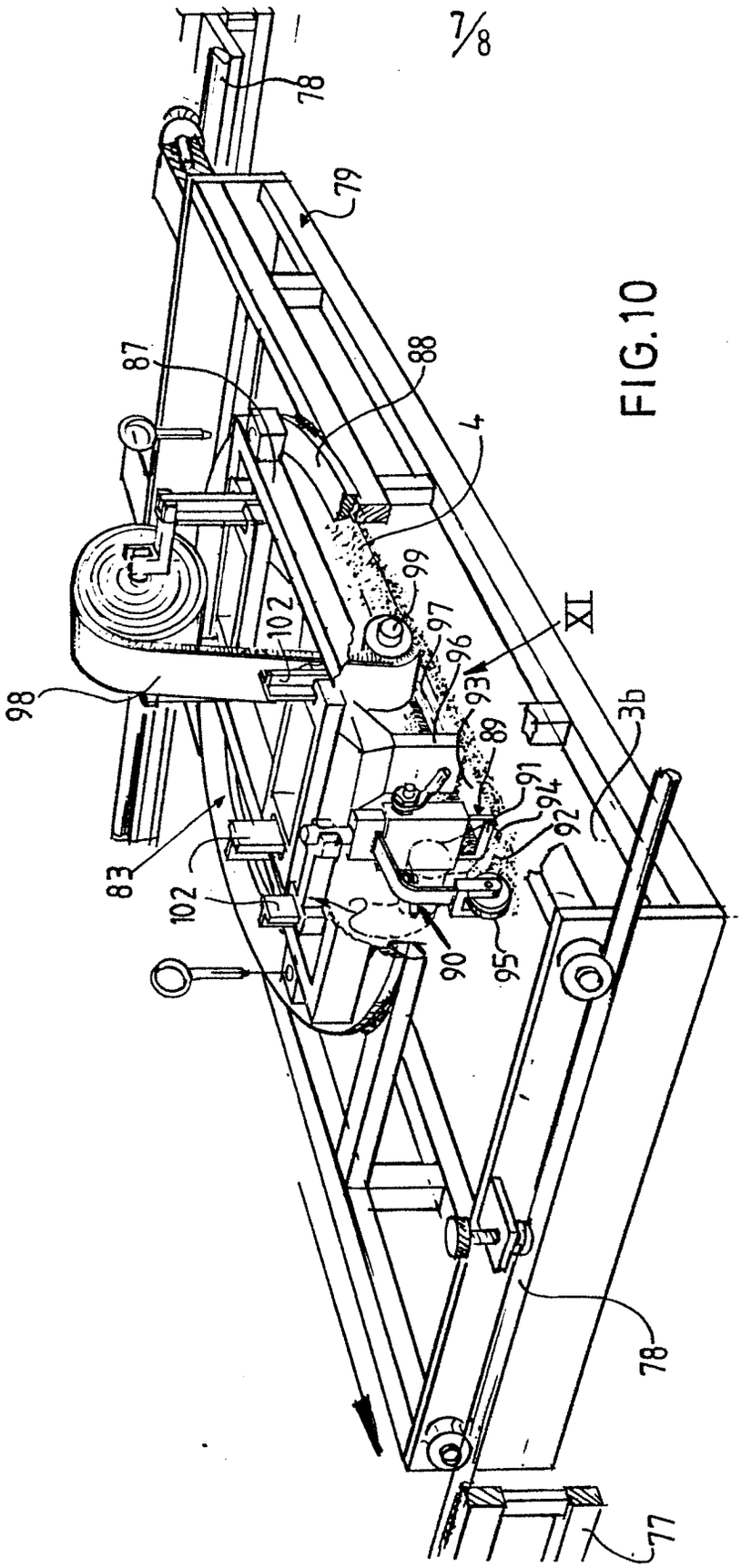

FIG.10

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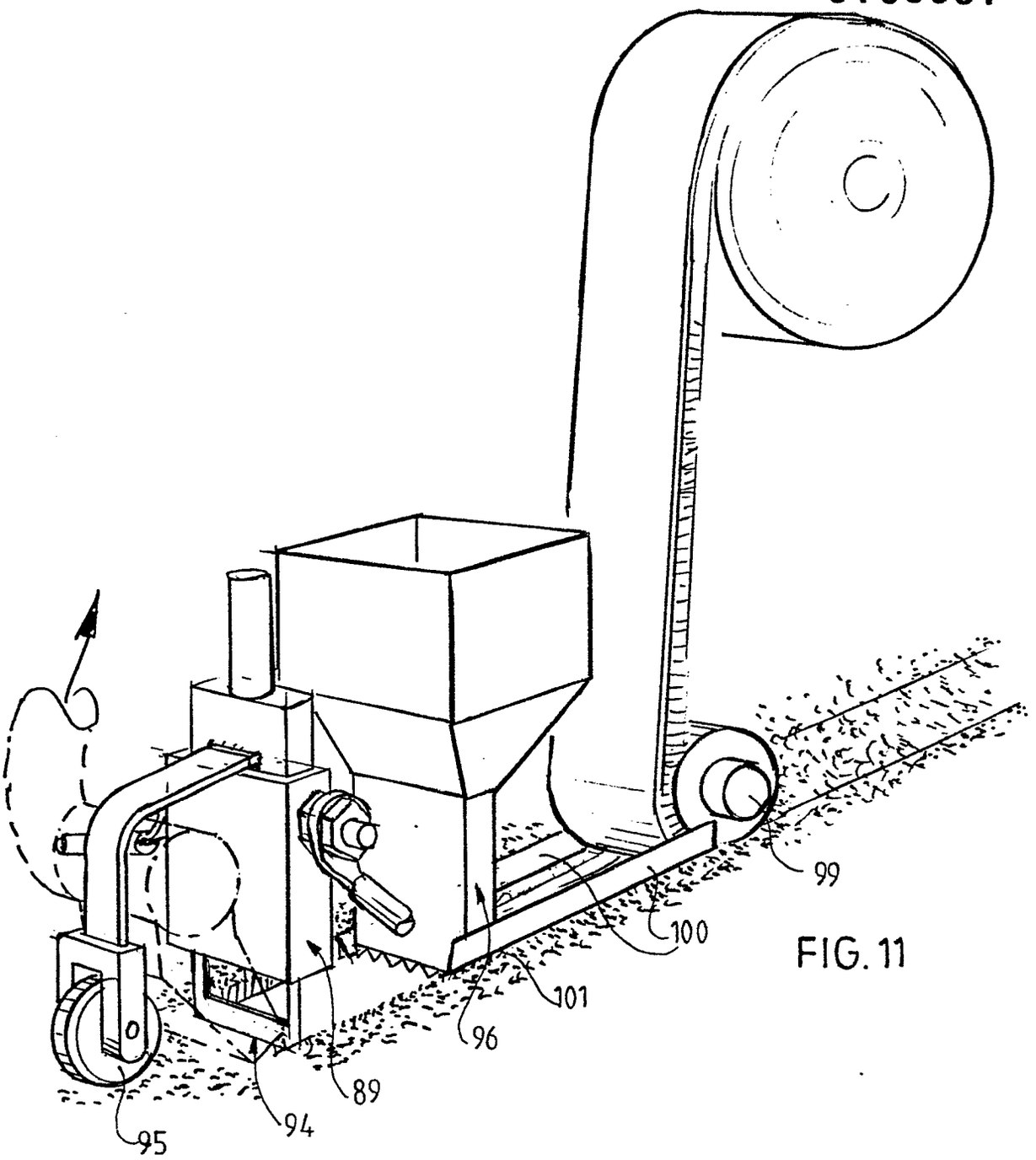

FIG. 11