(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 050 630 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.11.2000 Bulletin 2000/45

(51) Int. Cl.[7]: **E02F 3/84**, E02F 7/02

(21) Application number: **00108533.1**

(22) Date of filing: **19.04.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **07.05.1999 IT MI991001**

(71) Applicant:
Ing. Luigi Conti Vecchi S.p.A.
09032 Assemini (Cagliari) (IT)

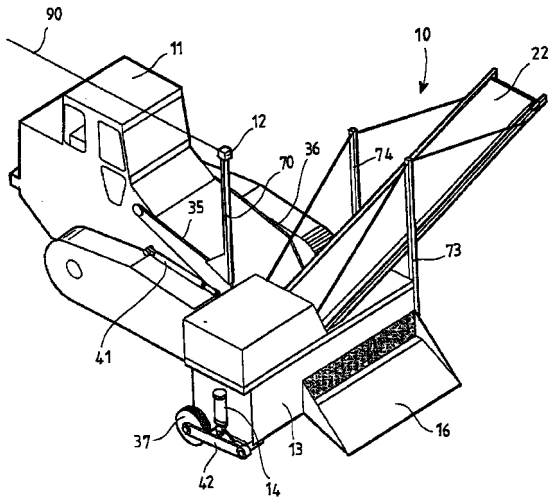
(72) Inventors:
- **Pirazzoli, Franco**
  09100 Cagliari (IT)
- **Garau, Roberto**
  09045 Quartu Sant'Elena - Cagliari (IT)

(74) Representative:
Gennari, Marco, Dr.
c/o EniTecnologie S.p.A.,
BREL,
Via F. Maritano, 26
20097 San Donato Milanese, Milano (IT)

(54) Salt-collecting device

(57) A device for the collection of salt, comprises a set of conveyor belts (21, 22) and a shovel (16) for digging and collecting the salt (30). The special characteristic of the invention lies in the fact that the shovel (16) for digging and collecting the salt (30) is combined with a supporting structure (13) which can be connected to a motor machine (11) by means of articulation mechanisms (35, 36, 15), and in the fact that devices are linked to the digging and collecting shovel (16) for regulating its working position, operating by means of a signal (90) indicating a reference quota.

Fig.4



EP 1 050 630 A2

Description

[0001] The present invention relates to a device for the collection of salt, in particular sea salt.

[0002] As is known, the collection of salt is effected in salinas, i.e. in suitable land areas in which sea water is left to evaporate to obtain sodium chloride.

[0003] Salinas are situated in flat areas, close to the sea, and generally occupy wide extensions. They consist of a series of basins, with an impermeable and shallow bottom, called "evaporation" basins. In salinas, the sea water passes in succession from one basin to another, also due to natural gradients, reaching an ever-increasing concentration; it then enters "salting" basins where, due to evaporation, the salt crystallizes and can therefore be collected.

[0004] The existence of sea salt collecting machines which are generally constructed so that the collecting shovel is solidly connected to the motor machine, is known.

[0005] These machines, however, because of the fact that the collecting shovel is solidly connected to the motor machine, owing to the gradients and irregularity of the ground, do not allow easy separation of the salt from the earth and sand. In fact it happens that the earth and sand are often detached with the salt itself and must be transported with the salt to be removed only in a later period, with obvious disadvantages and expenses.

[0006] It has also been observed that, in the known collecting machines, the digging depth control of the shovel is effected "by sight", with a wide use of means and labour.

[0007] An objective of the present invention is consequently to provide a device for the collection of salt which is capable of overcoming the drawbacks which have so far been met with the collecting machines in use, in particular providing a device which allows accurate digging and lifting regulation of the layer of salt, without the presence of an operator.

[0008] Another objective of the invention is to provide a device for the collection of salt which is safer and easier for the workers.

[0009] A further object of the present invention relates to providing a device for the collection of salt which can be removed from its motor machine thus allowing the latter to be used for other purposes, once the collecting operation has been completed.

[0010] These and other objectives are achieved by means of a device for the collection of salt, according to claim 1, to which reference can be made for the sake of brevity.

[0011] The collection device according to the present invention allows great advantages to be obtained with respect to the operating times and purity of the salt removed, (especially if the operation is carried out in the presence of water) already in the removal phase itself from the ground. In fact, the control provided by the articulation mechanisms of the position of the digging and collection shovel, obtained by means of a reference signal, enables the position of the digging and collection shovel to be adapted to the ground conditions of the sauna in question.

[0012] A second aspect of the invention, linked to the previous one, lies in the fact that the digging and collecting shovel has the advantage of being able to be inclined as desired, with respect to the ground. This means that the digging and collecting shovel can be inclined so as to detach and lift only the layer of salt which is then loaded onto transporting devices without the excess of earth and sand which, as already mentioned, normally accompanies the salt collected with the systems usually adopted. The control system of the position of the digging and collecting shovel can be advantageously regulated and set up by the driver of the motor machine.

[0013] Finally, the device for the collection of salt is not necessarily solidly joined to its own motor machine, so that once the collection operation has been completed, the motor machine can be advantageously adopted for other purposes.

[0014] Further objectives and advantages of the present invention will appear evident from the following description and enclosed drawings, provided for purely illustrative and non-limiting purposes, wherein:

- figure 1 represents a side view of the salt collection device according to the present invention, associated with a motor machine;
- figure 2 represents a front view of the device of figure 1;
- figure 3 represents a cinematic scheme of the collecting belt system of the device of the invention;
- figure 4 represents a prospective view of the salt collecting device of the previous figures; and
- figure 5 represents a side, partially sectional, view of the motor roll belonging to the salt collecting device of the previous figures.

[0015] With particular reference to the above-mentioned figures, the salt collection device, according to the present invention, is globally indicated with the reference number 10 and is connected, during normal conditions of use, to a motor machine 11.

[0016] The device 10 comprises a shovel 16 for digging and collecting the salt 30 and a series of conveyor belts 21 and 22, separate from the motor machine 11, the whole combined with a supporting structure 13.

[0017] In particular, there is an oblique loading belt 22, equipped with independent motorization, by means of the motor 33, and also a collecting belt 21, onto which the salt 30 collected by the shovel 16 is initially deposited.

[0018] The functioning of the digging and collecting shovel 16, and consequently the digging and lifting of the layer of salt 30, is regulated by means of a laser

receiver 12, controlled and set up by the driver of the motor machine 11, to which the collecting device 10, according to the present invention, is joined. The device 10 also comprises the presence of an electro-hydraulic transducer 17, regulated by the laser 12 and preferably assembled on the motor machine 11.

[0019] It can be observed that the supporting structure 13 for the digging and collecting shovel 16, is not rigidly connected to the motor machine 11, but has a pair of wheels 37, 38 and is connected to the motor machine by means of moving arms 35, 36 and levers 15.

[0020] The moving arm 35 is connected to the motor machine 11 by means of a hinge 50 and to the supporting structure 13, by means of a hinge 51, and is activated by an actuator 41. The moving arm 36 has similar characteristics (not represented).

[0021] The lever 15 is connected to the moving arm 35 by means of a hinge 52 and to the supporting structure 13 by means of a hinge 54, running inside a guide 55.

[0022] A rod 42 to which an actuator 14 is connected, is joined to the wheel 37, whereas a rod 62 to which an actuator 64 is connected, is joined to the wheel 38. The rods 42 and 62 are hinged to the supporting structure 13, so that both of the actuators 14 and 64 are able to act in a more or less vertical direction on the supporting structure 13, in particular to regulate the position of the digging and collecting shovel 16 with respect to the ground.

[0023] In addition, a rod 70, which in turn sustains the laser receiver 12, is additionally connected, by means of a support 75, to the moving arm 35.

[0024] The sea salt collecting device 10, as previously specified, has a system of toothed belts 21 and 22, partially contained in the supporting structure 13, which send the salt 30 to a transport lorry 40.

[0025] More specifically, the motor belt 22 is inclined with respect to the horizontal, as it is supported by means of supporting rods 73, 74, and is able to convey the salt 30 to the lorry 40, or other external means of transport, and is activated by a motor drum 18, supported by bearings 31 and connected by means of an elastic joint 32 to a motor 33.

[0026] The toothed belt 21 extends between a thrust drum 19 and a set of intercepting rolls 80, 81 and 82. In addition, a device for varying the tension of the belt 21, depending on the specific requirements, can be included in correspondence with the intercepting roll 80.

[0027] The functioning of the salt collecting device of the present invention takes place according to the following procedure.

[0028] The remote infra-red source sends an infrared signal 90 which defines a reference quota; this signal 90 is picked up by the laser receiver 12, which is firmly connected, by means of the support 75, to the moving arm 35.

[0029] The laser receiver 12 consequently sends a corresponding series of signals to the electro-hydraulic transducer 17, which acts on the actuators 41, 42 and 64 to position the digging and collecting shovel 16 in correspondence with the desired quota.

[0030] More specifically, the operating position of the digging and collecting shovel 16 is regulated, in a horizontal direction, by the actuator 41, by acting on the moving arm 35 and by a corresponding actuator (not shown) acting on the moving arm 36.

[0031] It can be seen that, to avoid the detachment of the wheels 37 and 38 from the ground, actuators 42 and 64 act on the respective rods 42 and 62, hinged to the supporting structure 13.

[0032] The digging and collecting shovel 16 can also be inclined as desired with respect to the ground, by the cooperation of the horizontal 41 and vertical 14 and 64 actuators and corresponding articulation mechanisms.

[0033] This control system of the position of the digging and collecting shovel 16 is controlled and set up by the driver of the motor machine 11. In this way, the salt layer 30 is detached from the ground, without the undesired presence of earth and sand, whereas it is removed by lifting and transfer by means of the conveyor belts 21 and 22, to the collecting lorry 40.

[0034] The motor machine 11 used in combination with the salt 30 collection device 10, is preferably a slow, powerful machine and is naturally equipped with an adequate hydraulic system.

[0035] The characteristics of the salt collection device object of the present invention and also its advantages are evident from the above description.

[0036] In particular, they are represented by the fact that the collection device according to the present invention makes the work safer and easier for the operators, with considerable advantages in the operating times and purity of the salt removed, already in the removal phase itself from the ground.

[0037] There is also the advantage that the digging and collection shovel can be inclined as desired, with respect to the ground, by means of the system regulated by the laser, so that only the salt layer is detached and lifted and is then deposited on means of transport, without undesired excesses of earth and sand, whatever the crystalline structure may be.

[0038] Finally, it is evident that numerous variations can be made to the salt collecting device, object of the present invention, remaining however within the inventive principles contained therein, and it is also evident that, in the embodiment of the invention, the materials, forms and dimensions of the details illustrated can vary according to the demands and can be substituted with other technically equivalent alternatives.

Claims

1. A device for the collection of salt, comprising a series of conveyor belts (21,22) and a shovel (16)

for the digging and collection of salt (30), characterized in that the above digging and collecting shovel (16) is associated with a supporting structure (13) which can be connected to a motor machine (11) by means of articulation mechanisms (35, 36, 15), wherein devices for regulating the operating position of the above digging and collecting shovel (16), operating by means of a signal (90) indicating a reference quota, are connected to the above digging and collecting shovel (16).

2. The device according to claim 1, characterized in that the devices for regulating the operating position of the above digging and collecting shovel (16) comprise a laser receiver (12), which receives the above reference signal (90) from an infra-red source and communicates with an electro-hydraulic transducer (17) to activate the above articulation mechanisms (35, 36, 15).

3. The device according to claim 2, characterized in that the above articulation mechanisms comprise a pair of moving arms (35, 36), each activated by an actuator (41).

4. The device according to claim 3, characterized in that levers (15) are connected to the above pair of moving arms (35, 36), each lever being connected, in turn, to the above supporting structure (13) by means of a hinge (54) running inside a guide (55).

5. The device according to claim 3, characterized in that the devices for regulating the operating position of the above digging and collecting shovel (16) comprise a pair of actuators (14, 64), each of which operating on respective rods (42, 62), hinged to the above supporting structure (13), so as to act thereon in a vertical direction.

6. The device according to claim 5, characterized in that a respective wheel (37, 38) is connected to each of the above rods (42,62), hinged to the above supporting structure (13).

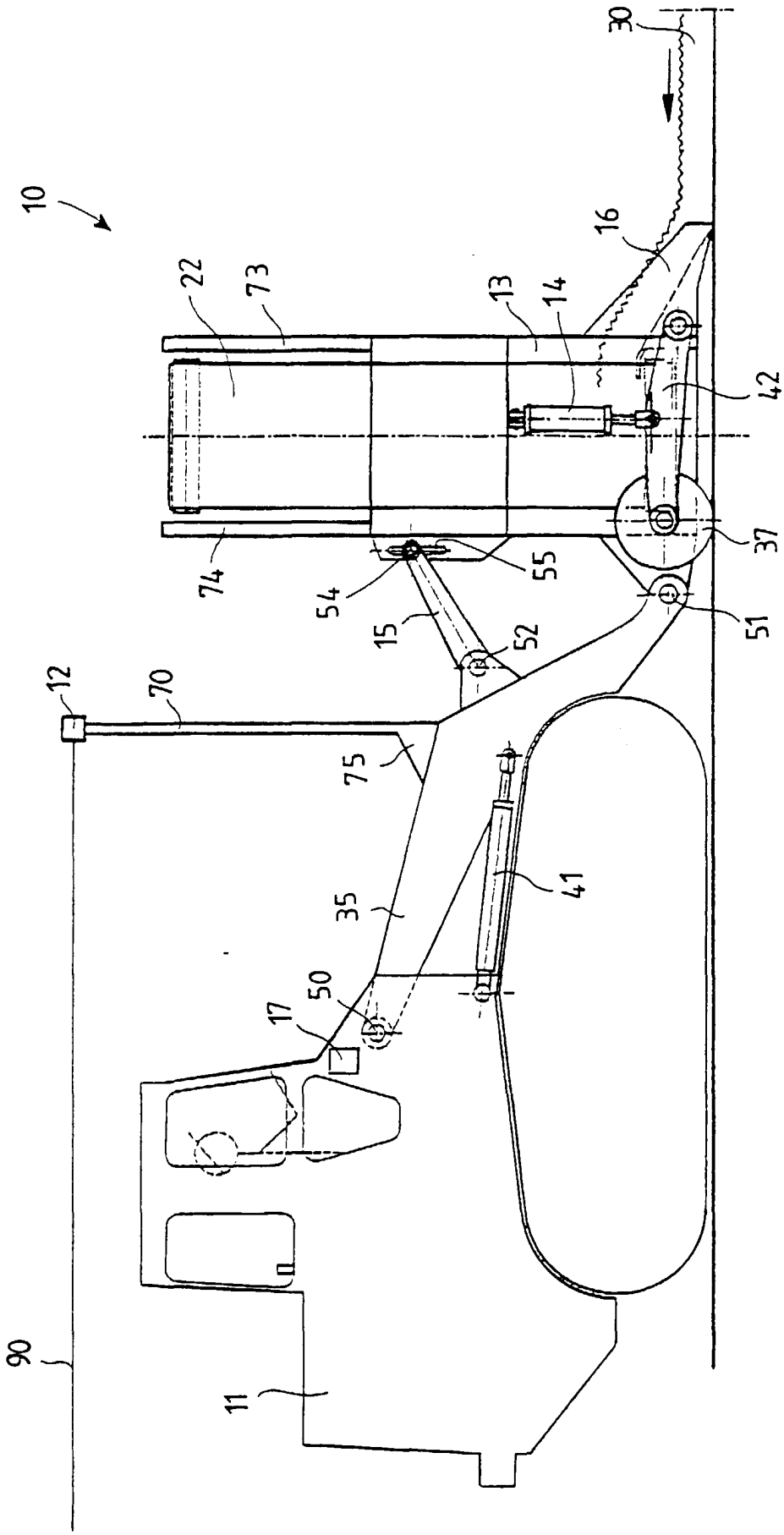
7. The device, according to claim 1, characterized in that the above series of conveyor belts (21, 22) for salt (30) has an oblique loading belt (22), equipped with independent motorization, and a collection belt (21), on which the salt (30) collected from the shovel (16), is deposited.

8. The device according to claim 2, characterized in that the above electro-hydraulic transducer (17) is assembled on the above motor machine (11).

9. The device according to claim 1, characterized in that the above supporting structure (13) can be removed from the above motor machine (11).

10. A device for the collection of salt, as substantially described and illustrated in the enclosed drawings.

Fig.1



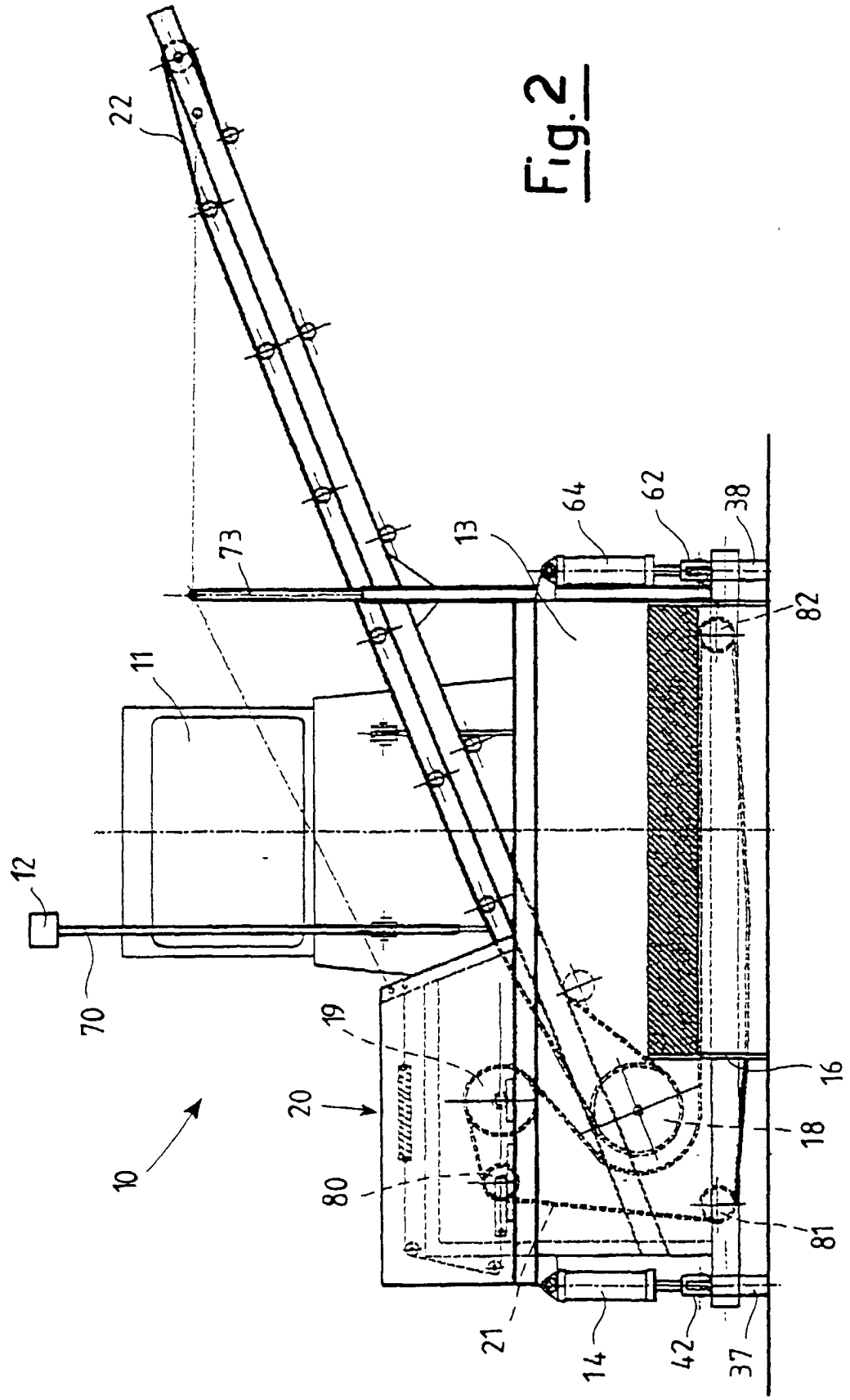


Fig.2

Fig.3

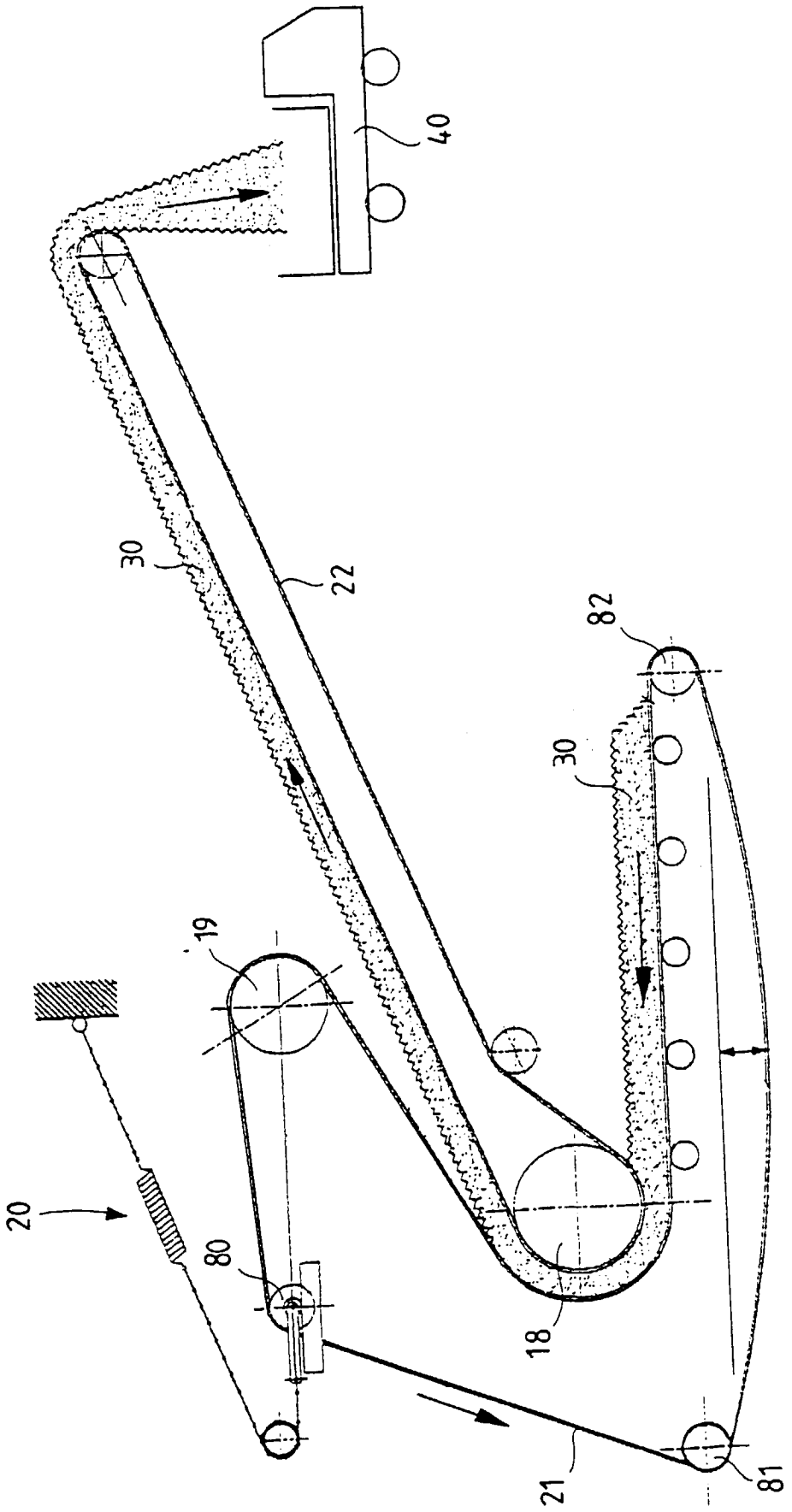


Fig.4

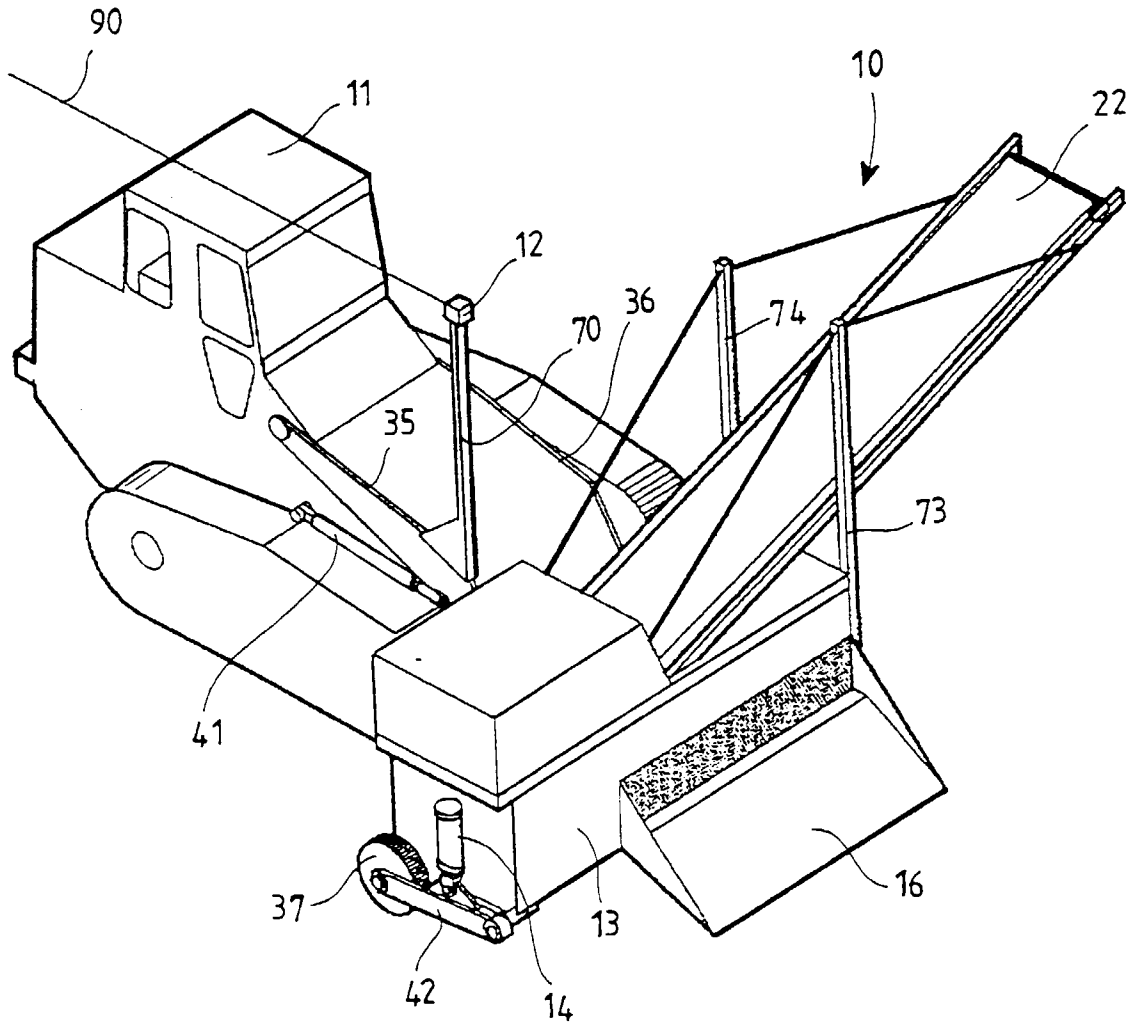


Fig.5