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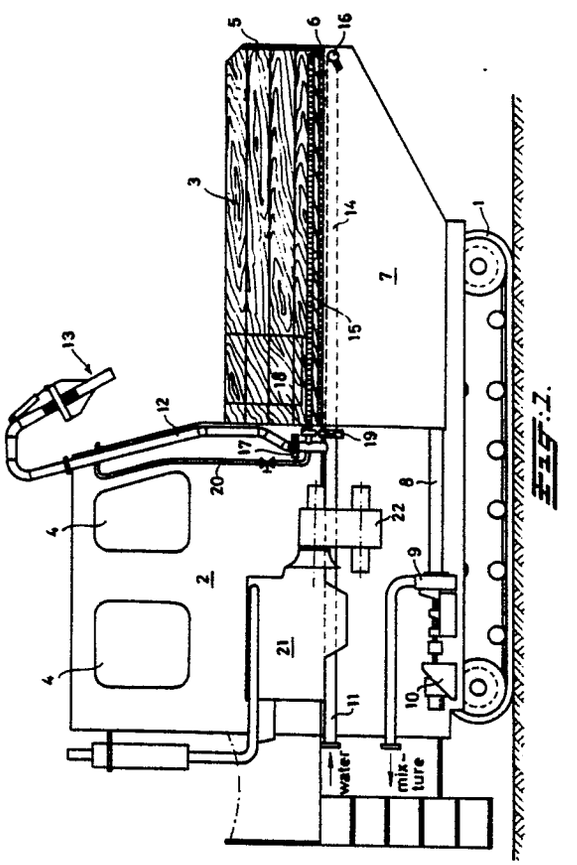
(54) Device for removing explosive material from soil.

(57) A device for removing explosive material such as old ammunition and the like from soil. Said device comprises a mobile frame having an armoured control cab (2) and a collection bin (3) for the soil, said collection bin being provided with a bottom consisting of perforated plates (6). Disposed above the collection bin, is a spray lance (13) which is controllable from the cab and is connected with a water supply pipe (11, 12). Under the perforated plates (6) and near the bottom of the bin a discharge pipe (8) is arranged in which a discharge pump is accommodated for discharging the mixture of soil and water. The explosive objects remain in the collection bin and can be recognized as such and rendered harmless.



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Device for removing explosive material from soil.

The present invention relates to a device for removing explosive material such as old ammunition and the like from soil.

Such a device is used for removing explosives which have, for example, been in the ground since the last world war.

The object of the invention is to produce a device by means of which these explosives can be efficiently separated from the soil, and with which optimum safety for the operating personnel is ensured.

These objects are achieved according to the invention through the device comprising:

- a mobile frame containing an armoured control cab and a collection bin for the soil, said collection bin being provided with a bottom consisting of perforated plates;
-disposed above the collection bin, a spray lance which is controllable from the cab and is connected to a water supply pipe;
-a collection tank which is disposed under the perforated plates of the collection bin, and near the bottom is provided with a discharge pipe in which a discharge pump is accommodated.

The soil is emptied into the collection bin of the device by means of a conventional excavator which is armoured against possible explosions. A powerful jet of water is then directed on the soil with the spray lance, so that sand and mud are taken through the perforated plates to the collection tank situated underneath the collection bin. Larger pieces and possible explosive objects remain behind in the collection bin and can be removed from it. Explosive objects can be recognized as such and rendered harmless. During the flushing away of the soil, the personnel are in the armoured cab of the machine and run practically no risk in the process, while still being able to have a good view of the work.

It is preferable to have disposed along the inside of the walls of the collection bin a spray pipe, which is connected by means of a valve to the water supply pipe of the spray lance. This spray pipe is for flushing the grid and the collection bin clean.

In a prefereed embodiment of the invention, one or more spray nozzles are disposed in the collection tank, and are connected to the water supply pipe of the spray lance. These spray nozzles are for the purpose of maintaining water circulation when the spray lance and the spray pipe are not in operation. This prevents the discharge pump accommodated in the discharge pipe from running dry.

The spray nozzles are preferably connected to the water supply pipe by means of an excess pressure valve.

When the spray lance and the spray pipe are not in operation, the pressure in the water supply pipe will increase, and this rise in pressure causes the valve to the spray nozzles to open, so that a water supply to the discharge pump is automatically ensured.

The walls of the collection bin are preferably clad on the inside with wood, so that if an explosion takes place, ricocheting of shell splinters and the like against the walls is avoided. The wood also provides effective protection for the walls. Since the perforated plates forming the bottom of the collection bin are detachable, they can easily be replaced if damaged by any explosion.

The invention is explained with reference to the appended drawing, in which:

Fig. I shows a schematic cross section of the device according to the invention; and

Fig. 2 shows a top view of the device of Fig.I.

As can be seen in particular from Fig.I, the device according to the invention comprises a mobile frame which is provided with caterpillar tracks I, a control cab 2, and a collection bin 3. The cab 2 is provided with panels 4 of armour-plated glass, and is designed in such a way that operating personnel in it are virtually fully protected against a possible explosion.

The collection bin 3 is rectangular in top view, with upright walls 5, which are clad with wood on the inside, preferably with deal about 2.5 cm thick. The wood cladding provides effective protection of the upright walls, on the one hand, while the ricocheting of shell splinters against the walls is avoided, on the other. The bottom of the collection bin 3 consists of a grid 6, which is formed by a number of perforated plates which are disposed detachably and can thus easily be replaced in the event of damage. Under the collection bin 3 is a collection tank 7, which is trough-shaped with downward-sloping side walls. Near the bottom of the collection tank 7 is a discharge pipe 8, in which a discharge pump is accommodated, suitable for pumping a water and soil mixture, and driven by a hydraulic motor I0. The discharge pipe 8 extends to the rear side of the device and a discharge pipe (not shown) can be connected to it. If the water and soil mixture has to be transported over a distance of more than I km, extra pumps of the same type as pump 9 will have to be disposed in the discharge pipe.

The device is also provided with a water supply pipe II which extends forwards from the rear side thereof and divides near the front of the cab 2 into a pipe I2 which leads to a spray lance I3, disposed above the collection bin 3, and an essentially through pipe I4. The spray lance I3, which can be controlled from the cab, is of a known type and need not be described in detail here. Connected to the pipe I2 is a branch pipe I5, which extends along the inside of the walls 5 of the collection bin 3 and is provided at regular intervals with openings. The pipe I5 thus forms a spray pipe for flushing away the material through the grid 6.

The through pipe I4 leads to a spray nozzle I6, which is provided inside the collection tank 7 under the grid 6, and the object of which will be clear in the description of the working of the device. Disposed in the pipes I2, I5 and I4 are valves I7, I8 and I9 respectively. Connected to the pipe I2 is another pipe 20 for feeding a screen washer for the windscreen of the cab.

The vehicle is driven by a diesel engine 2I, which also drives the hydraulic motor I0 and hydraulic pumps 22 for placing the water supplied by the pipe II under pressure.

The device according to the invention works as follows:

Ground in which possibly explosive objects could be present is excavated using a conventional excavator, which is provided with suitable safety facilities, and is emptied into the collection bin 3. By means of the spray lance I3, a powerful jet of water is directed onto the soil in the bin 3, so that sand and mud and other small particles are flushed away through the grid 6 to the collection tank 7. The large parts and possibly explosive objects remain sprayed clean on the grid 6. Any explosives can be recognized as such and rendered harmless. The collection bin 3 is then emptied, and a new load of soil is emptied into the collection bin 3. During the examination for explosives left behind on the grid 6 and the removal thereof, the spray lance I3 is stopped by means of the valve I7, and the spray pipe I5 by means of the valve I8. This gives rise to the danger that the pump 9 for discharge of the soil and water mixture will run dry, which could lead to damage to it. However, the shutting off of the spray lance I3 and the spray pipe I5 gives rise to an increase in the pressure in the water supply pipe II. If the valve I9 is designed as an excess pressure valve, this increase in pressure results in the valve I9 opening and water being fed through the spray nozzle I6 into the collection tank 7. In this way the water circulation is maintained when the spray lance I3 and the spray pipe I5 are out of action, and damage to the pump 9 is avoided.

It will be clear that the invention is not limited to the embodiment shown and described, but that a number of variants are possible within the inventive idea.

Claims

I. A device for removing explosive material such as old ammunition and the like from soil, characterized by:
-a mobile frame containing an armoured controle cab (2) and a collection bin (3) for the soil, said collection bin being provided with a bottom consisting of perforated plates (6);
-disposed above the collection bin, a spray lance (I3) which is controllable from the cab and is connected to a water supply pipe (II, I2);
-a collection tank (7) which is disposed under the perforated plates of the collection bin, and near the bottom is provided with a discharge pipe (8) in which a discharge pump is accommodated.

2. A device according to Claim I, characterized in that disposed along the inside of the walls (5) of the collection bin is a spray pipe (I5), which is connected by means of a valve (I8) to the water supply pipe (I2) of the spray lance.

3. A device according to Claim I or 2, characterized in that disposed in the collection tank are one or more spray nozzles (6) which are connected to the water supply pipe (II) of the spray lance.

4. A device according to Claim 3, characterized in that the spray nozzles are connected to the water supply pipe by means of an excess pressure valve (I9).

5. A device according to one or more of the preceding claims, characterized in that the walls (5) of the collection bin are clad with wood on the inside.

6. A device according to one or more of the preceding claims, characterized in that the perforated plates (6) forming the bottom of the collection bin are detachable.

7. A device according to one or more of the preceding claims, characterized in that the armoured cab (2) is provided with a screen washer, which is connected to the water supply pipe (I2) of the spray lance by a pipe (20).

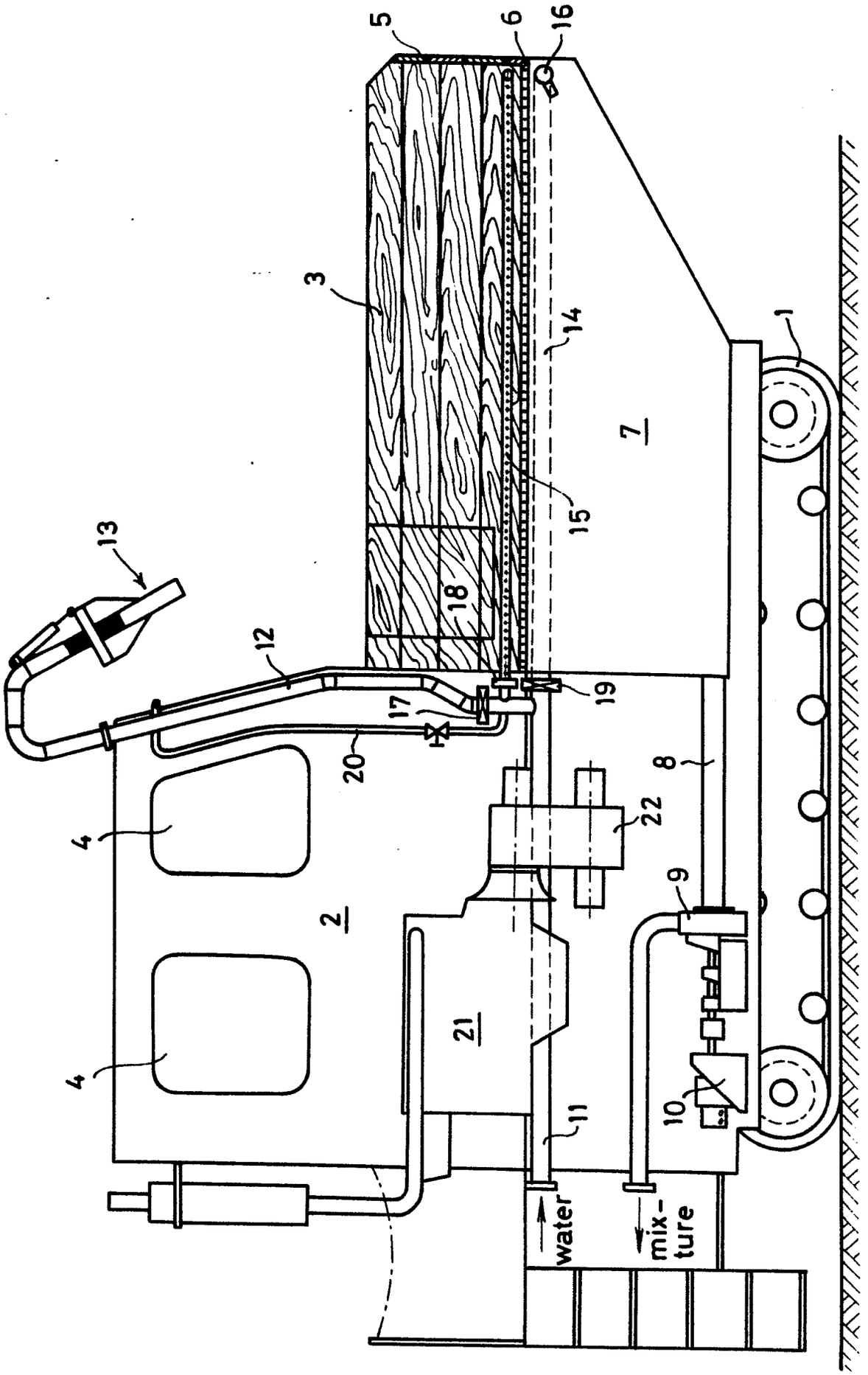

Fig.1.

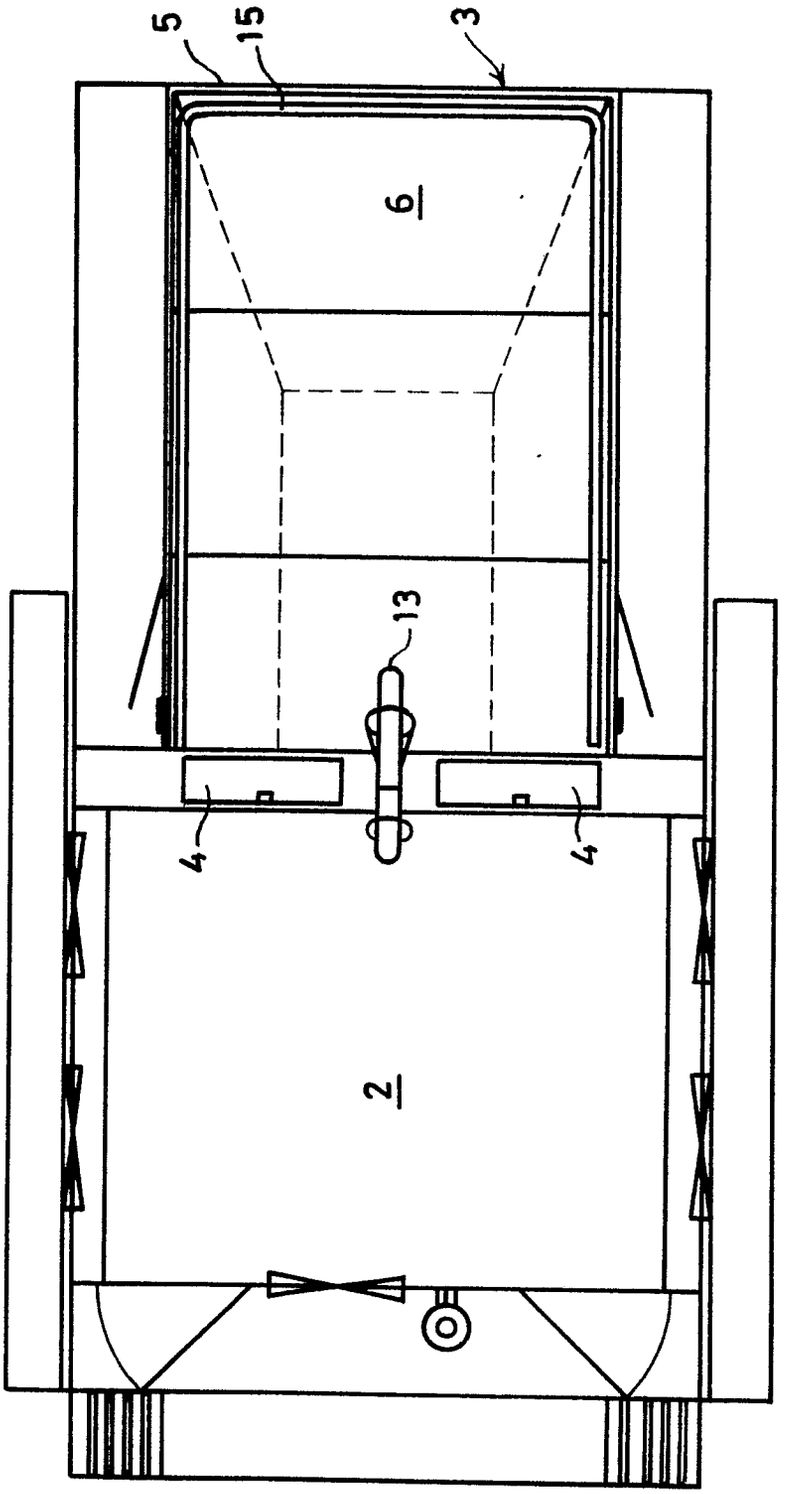

Fig.2.

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EUROPEAN SEARCH REPORT

Application Number

EP 87 20 1502

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	DE-A-3 335 464 (KRAUS-MAFFEI) * Page 1, conclusion 1; page 6, paragraphs 3,4; page 7, paragraph 4; page 8, paragraphs 1,2; page 10, paragraphs 2,3; figures *	1	F 41 H 11/16
A	US-A-3 395 798 (ERICKSON) * Column 1, lines 40-47,70-73; column 2, lines 1-52; column 3, lines 62-75; column 4, lines 1-34; figures 1-7 *	1,6	
A	EP-A-0 183 915 (AHLMANN) * Page 2, paragraph 2; page 3, paragraph 1; figures 1,2 *	1	
A	US-A-3 813 125 (SIMS et al.)		
A	US-A-2 727 623 (DEAVER)		
A	DE-C- 604 623 (BAUVEREINIGUNG)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

F 41 H
F 42 B
F 42 D
E 02 F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24-11-1987	VAN DER PLAS J.M.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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