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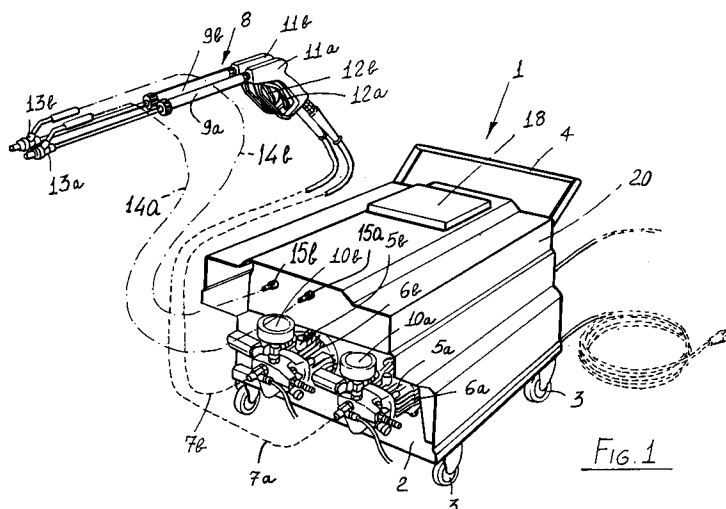
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(54) **Improved high efficiency hydro-sandblasting and/or hydro-cleaning machine.**

(57) The present invention relates to an improved machine which can be used as a hydro-sandblasting and/or hydro-cleaning machine (1), characterized in that said machine comprises a frame (2), provided with displacement wheel (3), and supporting at least two motor-pump units (5a,5b), driven by respective electric motors (6a,6b) and each of which is provided, at the outlet thereof, with a delivery duct (7a,7b) which can be coupled to a delivery assembly (8). The delivery assembly (8) comprises at least two

lance or nozzle elements (9a,9b), which can be connected to one another and driven either separately or simultaneously. The frame (2) supports moreover a sand tank (16), having at least two outlet fittings (15a,15b), which can be coupled, through respective pipes (14a,14b), to the lance or nozzle elements (9a,9b) of the delivery assembly (8) for delivering a pressurized liquid, supplied by the motor-pump units (5a,5b), and sand material (17).

**Fig. 1****EP 0 683 014 A1**

BACKGROUND OF THE INVENTION

The present invention relates to an improved high efficiency hydro-sandblasting and/or hydro-cleaning machine.

There are already known hydro-sandblasting and hydro-cleaning machines, which usually comprise a motor-pump unit which supplies, by pressurized water, a lance or nozzle element which is provided, along the pressurized water delivery duct, with a neck portion where is coupled a pipe communicating with a sand tank so as to provide, by a Venturi-type of effect, and as required, suction on sand material which is delivered together with the pressurized water supplied by the motor-pump unit.

These prior hydro-sandblasting and hydro-cleaning machines, however, in order to provide satisfactorily results with respect to the operation efficiency, must be separately driven by high power electric motors, so as to supply water at a comparatively high pressure and flow-rate.

Actually, even by using great power motors, it is not possible to provide, in all of the operating conditions, a very high efficiency in these prior machines.

In this connection, it is to be pointed out that frequently the operating places where these machines are operated do not comprise three-phase current thereby it is necessary to provide for use of a hydro-sandblasting and/or hydro-cleaning machine including at least a motor-pump unit or assembly adapted to be driven by a single-phase electric motor.

Obviously, if a three-phase supply is available, then it will be possible to exploit larger powers and, accordingly, two or more motor-pump units, either of a single-phase or of a three-phase type, can be simultaneously driven, or individually driven, so as to improve the operating efficiency.

SUMMARY OF THE INVENTION

In the light of the above discussion, the aim of the present invention is to overcome the above mentioned drawbacks, by providing a hydro-sandblasting and/or hydro-cleaning machine which includes two or more motor-pump units or assemblies, either of a single-phase and/or a three-phase type, which can be either separately and/or simultaneously driven, so as to allow one or more operator to operate with a very high efficiency in all of the possible operating conditions.

Within the scope of the above mentioned aim, a main object of the present invention is to provide such a machine which is specifically designed for always operating even under limited power supply conditions.

Another object of the present invention is to provide such a machine which is very flexible in operation and can be used in all of the building places under any power supply conditions.

Another object of the present invention is to provide such an improved hydro-sandblasting and/or hydro-cleaning machine which can be controlled by a single operator.

Another object of the present invention is to provide such a machine which is very reliable and safe in operation.

According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by an improved high efficiency hydro-sandblasting and/or hydro-cleaning machine, characterized in that said machine comprises a frame, provided with displacement wheels, supporting at least two motor-pump units, driven by respective electric motors and each being provided, at the outlet thereof, with a delivery duct, which can be coupled to a delivery assembly, comprises at least two nozzle elements which can be mutually connected and driven either separately or simultaneously, said frame supporting moreover a sand tank including at least two outlet fittings which can be coupled, through respective pipes, to said delivery assembly nozzle elements, in order to deliver a pressurized liquid supplied by said motor-pump units, as well as a sand material.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the present invention will become more apparent hereinafter from the following detailed disclosure of a preferred, though not exclusive, embodiment of an improved machine, to be used as a hydro-sandblasting and/or hydro-cleaning machine, according to the present invention, which has been illustrated, by way of an indicative, but not limitative, example, in the figures of the accompanying drawings, where:

Figure 1 is a schematic perspective view illustrating the machine according to the present invention;

and

Figure 2 is a side elevation, partially cross-sectioned view illustrating the machine.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the number references of the above mentioned drawing figures, the improved machine, designed to be used as a hydro-sandblasting and/or hydro-cleaning machine, according to the present invention, and which has been gen-

erally indicated at the reference number 1, comprises a frame 2 which is provided, at the bottom thereof, with wheels 3 and, at the top thereof, with a handle element 4, for facilitating the handling thereof.

The frame 2 supports at least two motor-pump units, respectively indicated by the reference numbers 5a and 5b, which are driven by respective electric motors 6a and 6b, and are provided, at the outlets thereof, with a delivery duct 7a and 7b, respectively, which can be coupled to a delivery assembly 8.

The delivery assembly 8 comprises at least two lance or nozzle elements 9a and 9b which are connected to one another so as to be simultaneously operated by a single operator.

More specifically, the motor-pump units 5a and 5b are provided, near the connection portion of the delivery ducts 7a and 7b, with valve assemblies of any known type, which are driven so as to supply, either simultaneously or individually, the lance or nozzle elements 9a and 9b.

Moreover, on the outlet of the motor-pump units 5a and 5b there are provided pressure gauges 10a and 10b allowing to control or monitor the delivery pressure of the liquid supplied by the mentioned motor-pump units.

The nozzle elements 9a and 9b of the delivery assembly 8 are provided with respective handles 11a and 11b, including related operating levers 12a and 12b, which can be operated either individually or simultaneously, depending on requirements.

The mentioned lance or nozzle elements, in particular, can also be separately operated by several operators.

The nozzle elements 9a and 9b are provided, along their pressurized liquid delivery duct, as supplied with pressurized liquid by the motor-pump units 5a and 5b, with respective fittings 13a and 13b, for connecting pipes 14a and 14b which can be in turn connected to outlet fittings 15a and 15b communicating with a tank 16, supported by said frame 2, and holding sand material 17 for operating the machine as a hydro-sandblasting machine.

The tank 16 is closed, at the top thereof, by a removable or openable cover 18, for allowing the loading of the sand 17.

The outlet fittings 15a and 15b are preferably arranged at a wall of the tank 16, so as to hold said tank closed as the machine operates.

Thus, the tank is prevented from receiving moisture which would impair a proper fluidity of the sand material to hinder it from being properly sucked to the delivery assembly 8.

The suction of the sand material toward the delivery assembly 8 occurs by a Venturi effect, which is obtained by suitably shaping, in any known manner, the fittings 13a and 13b, or provid-

ing a neck along the pressurized liquid delivery ducts, said liquid being supplied by the motor-pump units 5a and 5b, at the fittings 13a and 13b.

It should moreover be pointed out that the fittings 15a and 15b are connected to suction ducts 15c and 15d dipping on the bottom of the tank 16.

The motor-pump units, arranged on the frame 2, can be two, or more, and the electric motors for operating the motor-pump units 5a and 5b can comprise, depending on requirements, either three-phase electric motors or single-phase electric motors, or they can also be constituted by single-phase electric motors and three-phase electric motors simultaneously, so as to meet all of the requirements related to the power available on the working place, as well as depending on the pressure and flow-rate requirements for the liquid supplied by the motor-pump units.

Thus, the hydro-sandblasting and/or hydro-cleaning machine according to the present invention is very flexible in operation, since it can be used with very good results even in the case of a reduced available power, while providing a very efficient performance.

As shown, the frame 2 and tank 16 are covered by a suitable casing 20.

The operation of the hydro-sandblasting and hydro-cleaning machine according to the present invention will be self-evident from the above disclosure.

In particular, it should be apparent that and operator can simultaneously work with two or more nozzle elements, constituting the delivery assembly 8, depending on the surface to be hydro-sandblasted and/or hydro-cleaned, and depending on the specific working requirements.

From the above disclosure and the observation of the figures of the accompanying drawings, it should be apparent that the hydro-sandblasting and/or hydro-cleaning machine according to the present invention fully achieves the intended aim and objects.

In particular, it is to be pointed out that a hydro-sandblasting and/or hydro-cleaning machine has been provided which is suitable to operate with a very great efficiency under the control of a single operator.

Moreover, owing to the use of motor-pump units provided with three-phase or single-phase electric motors, the subject machine will be able of properly operating even with a reduced installed power.

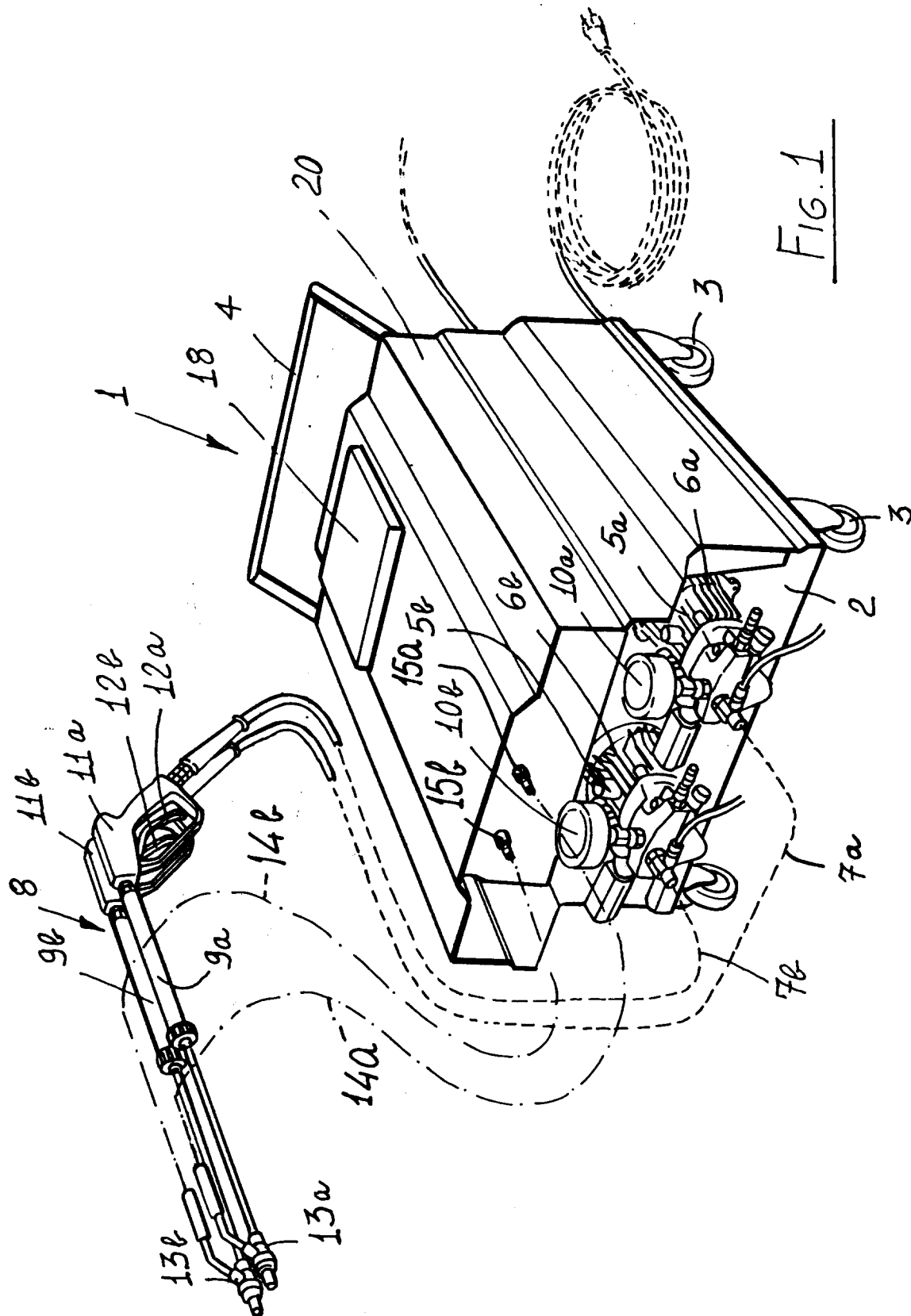
The improved machine according to the present invention is susceptible to several modifications and variations, all of which will come within the inventive scope.

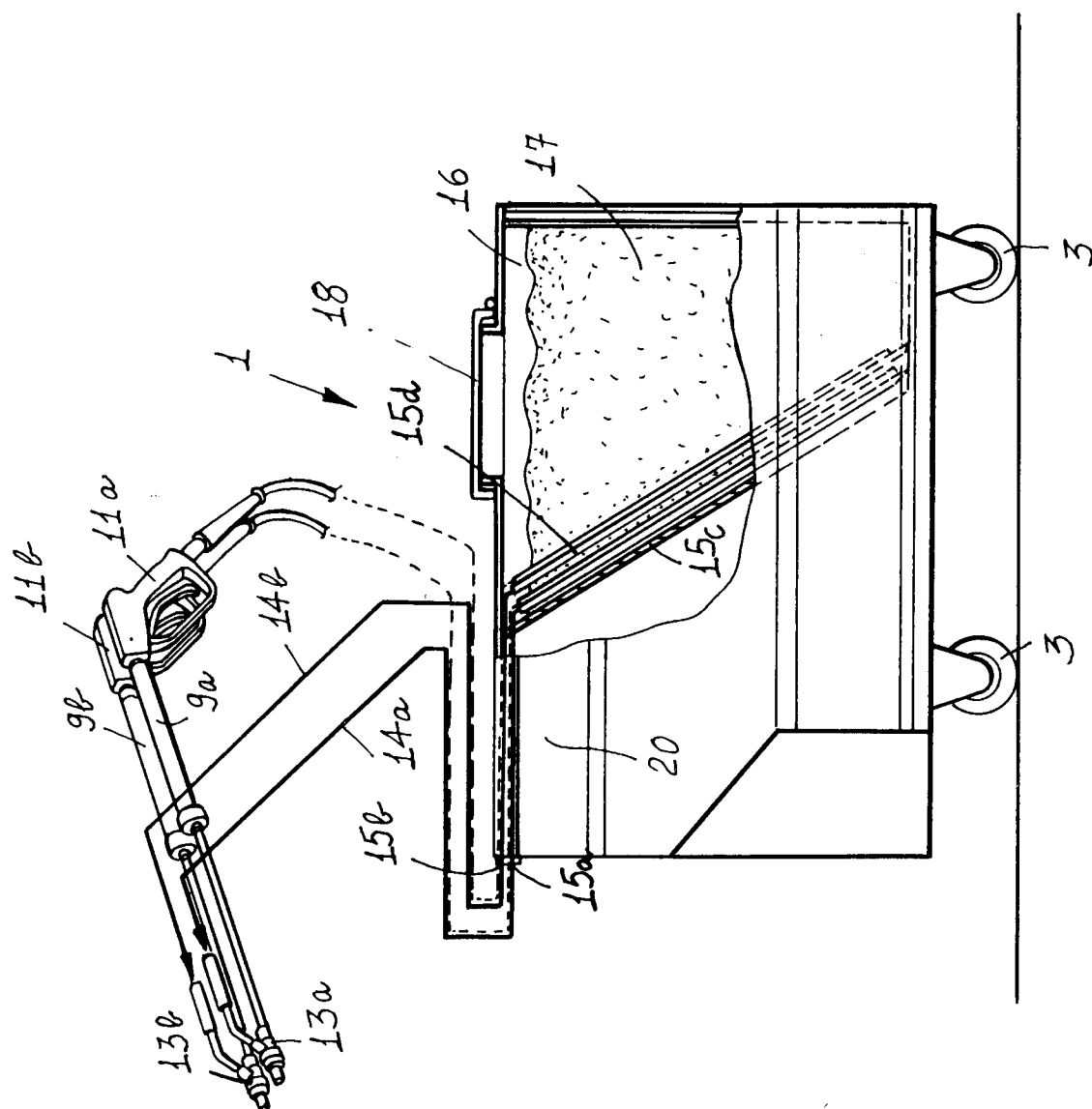
Moreover, all of the details can be replaced by other technically equivalent elements.

In practicing the invention, the used materials, as well as the contingent size and shapes, can be any, depending on requirements.

Claims

1. An improved high efficiency hydro-sandblasting and/or hydro-cleaning machine, characterized in that said machine comprises a frame, provided with displacement wheels, supporting at least two motor-pump units, driven by respective electric motors and each being provided, at the outlet thereof, with a delivery duct, which can be coupled to a delivery assembly, comprises at least two nozzle elements which can be mutually connected and driven either separately or simultaneously, said frame supporting moreover a sand tank including at least two outlet fittings which can be coupled, through respective pipes, to said delivery assembly nozzle elements, in order to deliver a pressurized liquid supplied by said motor-pump units, as well as a sand material. 10
2. An improved machine, according to Claim 1, characterized in that said electric motors comprise at least two three-phase electric motors. 25
3. An improved machine, according to Claim 1, characterized in that said electric motors comprise at least two single-phase electric motors. 30
4. An improved machine, according to Claim 1, characterized in that said electric motors comprise at least a single-phase electric motor and at least a three-phase electric motor. 35
5. An improved machine, according to one or more of the preceding claims, characterized in that the outlet fittings of the tank are coupled to pipes dipping on the bottom of the tank. 40
6. An improved machine, according to one or more of the preceding claims, characterized in that said machine is provided with a sand material holding tank having a closure cover provided for being held in a closed condition during the operation of said machine so as to prevent the sand material from being contacted by moisture. 45
7. An improved machine, according to one or more of the preceding claims, characterized in that on the motor-pump unit delivery ducts are arranged control valves for allowing the delivery assembly nozzle elements to be operated either simultaneously or individually. 50
8. An improved machine, according to one or more of the preceding claims, characterized in that said machine comprises a plurality of nozzle elements which are provided, along the pressurized liquid delivery duct thereof, with respective fittings, to which there are coupled pipes which can be in turn connected to outlet fittings communicating with said tank supported by said frame and holding said sand material for operating the machine as a hydro-sandblasting machine. 55
9. An improved machine, according to one or more of the preceding claims, characterized in that said sand material tank is closed at the top thereof by an openable cover in order to allow sand material to be loaded into said tank.
10. An improved machine, according to one or more of the preceding claims, characterized in that said sand material outlet fittings are arranged on a wall of said sand material tank, so as to allow said tank to be held closed during the overall operation of said machine.
11. An improved machine, according to one or more of the preceding claims, characterized in that the sand material is sucked toward said delivery assembly by a Venturi effect, provided by suitably shaping said fittings, or providing a neck along the pressurized liquid supply ducts, at said fittings.
12. An improved machine, according to one or more of the preceding claims, characterized in that the sand material conveying fittings are coupled to suction ducts communicating with said tank.



Fig. 2



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 95 83 0193

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.6)
A	GB-A-2 264 244 (CWR POWER CLEANING) * the whole document * ---	1,7	B24C1/00 B24C3/06 B24C5/02 B24C7/00 B08B3/02
A	DATABASE WPI Week 8841 Derwent Publications Ltd., London, GB; AN 88-286857 & DE-A-38 07 832 (WILO-WERK GMBH) * abstract * ---	2-4	
A	US-A-4 369 607 (BRUGGEMAN ET AL) * column 1, line 54-64; figure 1 * ---	5	
A	US-A-3 075 854 (BLUBAUGH) * column 2, line 70 - column 3, line 2; figure 2 * ---	6,9	
A	WO-A-84 03247 (FRAIS ET AL) * abstract * ---	8,10	
A	US-A-3 994 097 (LAMB) * column 3, line 46-60; figure 1 * ---	11,12	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	DE-A-15 77 648 (BOVONE) ---		B24C B08B B60S
A	GB-A-2 181 705 (DAVID VASSUS SHORUNKEH SAWYERR) ---		
A	US-A-3 149 438 (MORLEY ET AL) -----		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 1 September 1995	Examiner Petersson, B
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application I : document cited for other reasons & : member of the same patent family, corresponding document			