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(54) **Building yard apparatus for feeding cement to a mixing device**

(57) The object of the present invention is a building yard apparatus (1) suitable for feeding cement, water and any chemical additives to a mixing bucket for preparing concrete. The apparatus is associable to a cement tank (2) and comprises a hopper (10), a support structure (30) having a seating space (32) for the bucket, means for feeding the cement contained in the hopper towards the bucket and detecting means suitable for detecting the bucket setting in the loading position on the structure space.

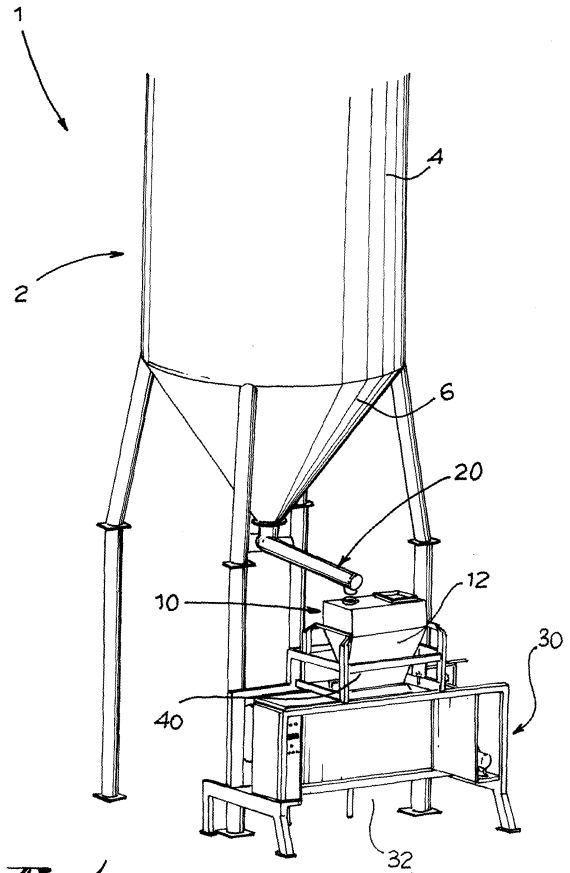


Fig. 1

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Description

[0001] The object of the present invention is a building yard apparatus suitable for feeding cement to a mixing device in order to prepare concrete.

[0002] As known, concrete is a mix of crushed stone, pebble gravel, sand and optional additives, as a whole defined as "inerts", cement and water.

[0003] In the building field, many systems are known for making concrete.

[0004] Some systems can be used only in quarries and comprise an apparatus, generally of large dimensions, suitable for feeding a vehicle provided with a rotating mixing tank, known as truck mixer, with inerts, cement and water. On request, the truck mixer is sent to a building yard where a construction is being made, for providing the builders with the concrete.

[0005] Such system can be used in particular when there is the need of a large amount of concrete for a single activity, for example for casting a floor.

[0006] When concrete is needed for activities differing from one another within the same yard, it is necessary to make a desired quantity thereof on site.

[0007] To this end, either manual mixing or small truck mixers are used wherein inerts, cement and water are poured. When the concrete is ready, it is carried in small amounts to the place where it is needed, generally using buckets or wheelbarrows.

[0008] As can be understood, the disadvantage of such system lies in the small amounts that can be carried, in the builder's efforts for the carriage thereof, in the long times for preparing the concrete.

[0009] A further apparatus consists of concrete mixing equipment with scraping beams, wherein concrete is moved by a crane. In this case, the amounts of concrete that can be moved may also be large, but it is necessary to have a crane for the movement.

[0010] On the other hand, the use of a mechanical shovel provided with a mixing bucket has been found to be more effective. In that case, inerts are loaded using the bucket itself and manually, or with a screw, cement and water and then poured therein. The bucket makes the mixing and moving the mechanical shovel, it is brought to the place where the concrete is needed.

[0011] A disadvantage of such system is above all in the time required for preparing the mix for the mixture.

[0012] Further systems for building yards are also shown in documents FR2816870, FR2616904, US4792234, FR2573338, FR2218744 and CA2238447.

[0013] In particular, document CA2238447 shows an apparatus comprising a silo, underneath which it is possible to place the opening of the tank of a truck mixer, wherein inerts, cement and water are fed.

[0014] However, also the apparatus described above exhibits some disadvantages, since it imposes the presence of an operator of the apparatus to control the start up of the same, and as an alternative, as generally happens, requires the truck mixer driver to get off the vehicle,

take care of setting the apparatus, actuate it, wait for the tank loading and then get on the vehicle again.

[0015] The object of the present invention is to meet the above needs by solving the disadvantages mentioned above with reference to the prior art.

[0016] Such object is achieved by an apparatus according to the following claim 1. The dependent claims describe embodiment variations.

[0017] The features and advantages of the apparatus according to the present invention will appear more clearly from the following description, made by way of an indicative and non-limiting example with reference to the annexed figures, wherein:

[0018] - figure 1 shows a perspective view of the apparatus according to the present invention;

[0019] - figure 2 shows a perspective diagram of the apparatus of figure 1, and

[0020] - figure 3 shows an operating diagram of the apparatus.

[0021] With reference to the annexed figures, reference numeral 1 globally denotes a building yard apparatus for feeding cement to a mixing device.

[0022] Apparatus 1 is associable to a mixing device comprising a mixing bucket, that is, a bucket provided with a mixing screw, generally made of two opposite halves, and a mechanical shovel, connectable to the bucket for carrying said bucket.

[0023] Apparatus 1 comprises a tank 2 suitable for containing powder cement.

[0024] Preferably, tank 2 comprises a tubular cylindrical wall 4, which extends by height, jointed at the bottom to a funnel wall 6, pierced at the bottom, for the concrete outlet.

[0025] In an embodiment variation, tank 2 exhibits a substantially horizontal axis.

[0026] Moreover, apparatus 1 comprises a hopper 10, arranged downstream of tank 2, in a suitable position for being fed with cement from said tank.

[0027] Preferably, hopper 10 comprises a side wall 12 shaped as a funnel, generally truncated cone or truncated pyramid.

[0028] IN accordance with a preferred embodiment, apparatus 1 comprises a screw system 20, arranged between tank 2 and hopper 10 for feeding the cement from the tank towards the hopper.

[0029] Said screw system 20 constitutes an example of embodiment of feeding means suitable for feeding the cement contained in tank 2 to hopper 10.

[0030] According to further embodiment variations, said feeding means consist of dropping means, such as a motor valve or a blade valve.

[0031] Moreover, apparatus 1 comprises a support structure 30 having a seating space 32 suitable for seating, at least partly, the bucket of the mixing device.

[0032] The seating space 32 is constructed on the basis of the dimensions of the mixing bucket, so as to have an optimal load of cement, water, inerts and optionally chemical additives for said mixing bucket, so as to de-

crease or even zero wastes and powder emissions.

[0033] In other words, the mixing bucket is seated within space 32 up to moving to such position as to be fed with the cement contained in hopper 10. Said position is called loading position.

[0034] In accordance with a preferred embodiment, the support structure 30 consists of a plurality of beams, for example section bars connected to one another for making an open box frame suitable for seating the mixing bucket.

[0035] Preferably, the support structure 30 comprises a bottom portion 34 that defines said seating space 32 and a top portion 36, constructed as a castle on said bottom portion 34, suitable for supporting said hopper 10.

[0036] Moreover, apparatus 1 comprises feeding means, operatively connected to said hopper, suitable for feeding the cement contained in hopper 10 towards the bucket seated in the seating space 32.

[0037] In accordance with a preferred embodiment, said feeding means comprise a moving partition, preferably seated in an emptying box 40 arranged downstream of hopper 10.

[0038] Preferably, said moving partition is provided with alternating motion by virtue of the coupling with a motor valve. The motor valve actuation imparts an alternating motion to the partition that generates a vibration of the hopper and of the concrete contained therein such as to stimulate the cement descent towards the bucket.

[0039] As can be understood, said moving partition with alternating motion and said motor valve represent an example of embodiment of stimulating means suitable for influencing the cement contained in the hopper for stimulating the cement drop towards the bucket.

[0040] Moreover, apparatus 1 comprises detecting means suitable for detecting the bucket setting to the loading position and for generating a relative setting signal. Said detecting means are operatively connected to the feeding means for actuating said feeding means in the presence of said setting signal.

[0041] In other words, when the bucket is arranged within the seating space 32, in a position suitable for being fed with the cement contained in hopper 10, the detecting means control said feeding means for feeding the bucket.

[0042] In accordance with a preferred embodiment, said detecting means comprises an oscillating bar 38, positioned in the seating space 32, on the bottom thereof, so as to be influenced by the bucket only when it is almost completely seated within space 32.

[0043] According to embodiment variations, said detecting means comprise laser sensors and/or photocells.

[0044] In accordance with a preferred embodiment, said apparatus 1 comprises weighing means, cooperating with said hopper 10, suitable for detecting the weight of the cement contained in hopper 10 and for generating a weighing signal at a predetermined amount of cement detected in said hopper.

[0045] For example, said weighing means comprise a

scale device 50, cooperating with said hopper.

[0046] Advantageously, said weighing means cooperate with said means for cement feeding from tank 2 to hopper 10, for preventing the feeding in the presence of said weighing signal.

[0047] In other words, when the desired amount of cement is detected in the hopper, said weighing means control the closing of said feeding means, so that the further cement feeding from tank 2 to hopper 10 is prevented.

[0048] Preferably, moreover, said apparatus 1 comprises hopper managing means suitable for being programmed by an operator for defining said predetermined amount of cement detected in said hopper.

[0049] In other words, by operating said hopper managing means, the operator sets the amount of cement that must be fed to the hopper.

[0050] According to a further embodiment, apparatus 1 comprises water dispensing means suitable for dispensing a predetermined amount of water in said bucket.

[0051] For example, said water dispensing means comprise a water tank 60, a pump 62 and at least one dispensing duct 64 arranged in said seating space 32 for dispensing water in said bucket.

[0052] According to a preferred embodiment, said dispensing means comprise at least two dispensing ducts 64, arranged in the proximity of the ends of said seating space 32, so that the water fed to the mixing bucket may drop at the sides of the bucket space, to the advantage of the mixing operation.

[0053] Advantageously, said water dispensing means cooperate with said detecting means for feeding said predetermined amount of water in the presence of said setting signal.

[0054] In other words, when the detecting means detect the mixing bucket in loading position, the detecting means control said water dispensing means, for feeding water to the bucket.

[0055] Preferably, moreover, apparatus 1 comprises water managing means suitable for being programmed by an operator for setting said predetermined amount of water to be dispensed in said bucket.

[0056] In other words, the operator may choose the amount of water that must be loaded with the cement and set such predetermined amount of water that will be dispensed to the bucket.

[0057] According to an even further embodiment, apparatus 1 comprises cycle managing means suitable for being programmed by an operator for having said apparatus carry out a single cement feeding cycle towards said hopper or for having said apparatus carry out repeated cement feeding cycles towards said hopper.

[0058] In other words, the operator may program apparatus 1 so that said apparatus loads the cement into the bucket only once or so that it is capable of carrying out such loading repeatedly.

[0059] In yet other words, in the first case, once the hopper has been emptied no further cement is loaded

from the tank to the hopper. In the second case, on the other hand, once the hopper has been emptied it is loaded with cement again.

[0060] In the standard operation of the apparatus, the operator programmes said cycle managing means, said water managing cycles and said hopper managing cycles in advance, so as to define the performance of multiple loading cycles, the amount of cement and the amount of desired water for each load.

[0061] When the apparatus is started, the screw system 20 feeds hopper 10 with the cement contained into the tank.

[0062] The weight of the cement contained into the hopper is detected by the weighing means. When an amount of cement is detected that is equal to the desired amount, set by the operator, the weighing means emit a weighing signal that controls the lock of the feeding means.

[0063] At the same time, said feeding means are locked if the bucket setting signal is not detected anymore: in fact, this would mean that the bucket has been brought out of the seating space.

[0064] When concrete is required, an operator, using the mechanical shovel carrying the mixing bucket, loads the inerts first, for example directly shovelling them from a heap.

[0065] After that, the mixing bucket is brought into the seating space, up to influencing said detecting means, that is, up to rotating bar 38.

[0066] Said detecting means then generate the setting signal, which controls the actuation of the cement feeding means from hopper 10 to the bucket.

[0067] In particular, the moving partition opens and the motor valve starts, thus imparting a vibration to the hopper that stimulates the cement drop into the bucket.

[0068] At the same time, the setting signal controls the actuation of the water dispensing means that dispense water to the bucket, up to the predetermined amount set by the operator.

[0069] At the end of the cement and water feeding, the bucket is carried out of the space.

[0070] While the mechanical shovel moves towards the place where the concrete is required, the worm screw of the bucket mixes inerts and concrete with water so that during the bucket movement, the concrete is already mixed.

[0071] Innovatively, the apparatus described above allows having concrete in a predetermined place of the yard, effortless, without waste and without builders' efforts.

[0072] Advantageously, moreover, the apparatus described above allows using the mechanical shovels for carrying the concrete and for a production thereof with large amounts.

[0073] According to a further advantageous aspect thereof, the apparatus described above allows updating existing cement tanks for imparting thereto the possibility of loading mixing buckets in an autonomous manner.

[0074] It is clear that a man skilled in the art can make changes and adjustments to the apparatus described above in order to meet specific and incidental needs, all falling within the scope of protection defined in the following claims.

Claims

1. An apparatus (1) for building yard suitable for feeding cement to a mixing device for preparing concrete, said apparatus being associable to a cement tank (2) suitable for cement storage, wherein said apparatus comprises:
 - a hopper (10) suitable for being fed with cement from said tank;
 - a support structure (30) having a seating space (32) suitable for seating, at least partly, a bucket of said mixing device in a loading position suitable for feeding cement from said hopper to said bucket;
 - feeding means, operatively connected to said hopper, suitable for feeding the cement contained in the hopper from said hopper to said bucket;
 - said apparatus being **characterised in that** it further comprises
 - detecting means suitable for detecting the bucket setting to the loading position and for generating a relative setting signal, said detecting means being operatively connected to the feeding means for actuating said feeding means in the presence of said setting signal.
2. An apparatus according to claim 1, wherein said hopper is fed by gravity.
3. An apparatus according to claim 1 or 2, wherein said feeding means are suitable for switching, in the presence of said setting signal, from a closed configuration to an open configuration, wherein they allow feeding the cement contained in the hopper towards the bucket.
4. An apparatus according to claim 3, wherein said feeding means comprise a moving partition.
5. An apparatus according to any one of claims 2 to 4, wherein said feeding means comprise stimulating means, suitable for operating on the cement contained into the hopper or on said hopper for stimulating the cement drop towards the bucket.
6. An apparatus according to claim 5, wherein said stimulating means comprise a motor valve suitable for placing said hopper in vibration for facilitating the drop of the cement towards said bucket.

7. An apparatus according to claim 5 or 6, wherein said stimulating means comprise a partition moving by alternating motion for generating a vibration of the hopper that stimulates the cement drop.
8. An apparatus according to any one of the previous claims, wherein said detecting means comprise a bar (38) arranged in said seating space (32), said bar being influenced by said bucket for signalling the setting of said bucket in said loading position.
9. An apparatus according to any one of the previous claims, further comprising weighing means (50), cooperating with said hopper, suitable for detecting the weight of the cement contained in said hopper and for generating a weighing signal at a predetermined amount of cement detected in said hopper.
10. An apparatus according to any one of the previous claims, further comprising second feeding means suitable for feeding the cement contained in the tank towards said hopper.
11. An apparatus according to claim 10, wherein said second feeding means comprise a screw system (20).
12. An apparatus according to claim 9 and according to claim 10 or 11, wherein said weighing means cooperate with said second feeding means, for preventing the feeding of the cement contained into the tank towards the hopper in the presence of said weighing signal.
13. An apparatus according to any one of claims 9 to 12, further comprising hopper managing means suitable for being programmed by an operator for defining said predetermined amount of cement detected in said hopper.
14. An apparatus according to any one of the previous claims, wherein said apparatus further comprises water dispensing means suitable for dispensing a predetermined amount of water in said bucket.
15. An apparatus according to claim 14, wherein said water dispensing means comprise a water tank (60), a pump (62) and at least one dispensing duct (64) arranged in said seating space for dispensing water in said bucket.
16. An apparatus according to claim 14 or 15, wherein said water dispensing means cooperate with said detecting means for feeding said predetermined amount of water in the presence of said setting signal.
17. An apparatus according to any one of claims 14 to 16, further comprising water managing means suitable for being programmed by an operator for defining said predetermined amount of water to be dispensed in said bucket.
18. An apparatus according to any one of the previous claims, further comprising cycle managing means suitable for being programmed by an operator for having said apparatus carry out a single cement feeding cycle towards said hopper or for having said apparatus carry out repeated cement feeding cycles towards said hopper.
19. An apparatus according to any one of the previous claims, wherein said structure (30) is suitable for supporting said hopper, said tank and said hopper being so arranged piled.
20. A feeding unit comprising an apparatus obtained according to any one of the previous claims and said cement tank.
21. A working unit for building yard suitable for preparing concrete, comprising:
- an apparatus according to any one of claims 1 to 19, and
 - said mixing device, wherein said mixing device comprises a bucket comprising mixing means suitable for mixing cement, water and inerts for obtaining concrete.
22. A unit according to claim 21, wherein said mixing device further comprises a mechanical shovel suitable for being connected to said bucket for carrying said bucket.
23. A method for feeding cement to a mixing bucket that can be carried out through a working unit constructed according to claim 22, comprising the steps of:
- setting a predetermined amount of cement;
 - feeding said predetermined amount of cement to said hopper;
 - placing a mixing bucket into said seating space;
 - detecting the setting of said bucket in loading position;
 - feeding said predetermined amount of cement to said bucket.
24. A method according to claim 23, comprising a step of setting a predetermined amount of water and a step of feeding said predetermined amount of water to said bucket.

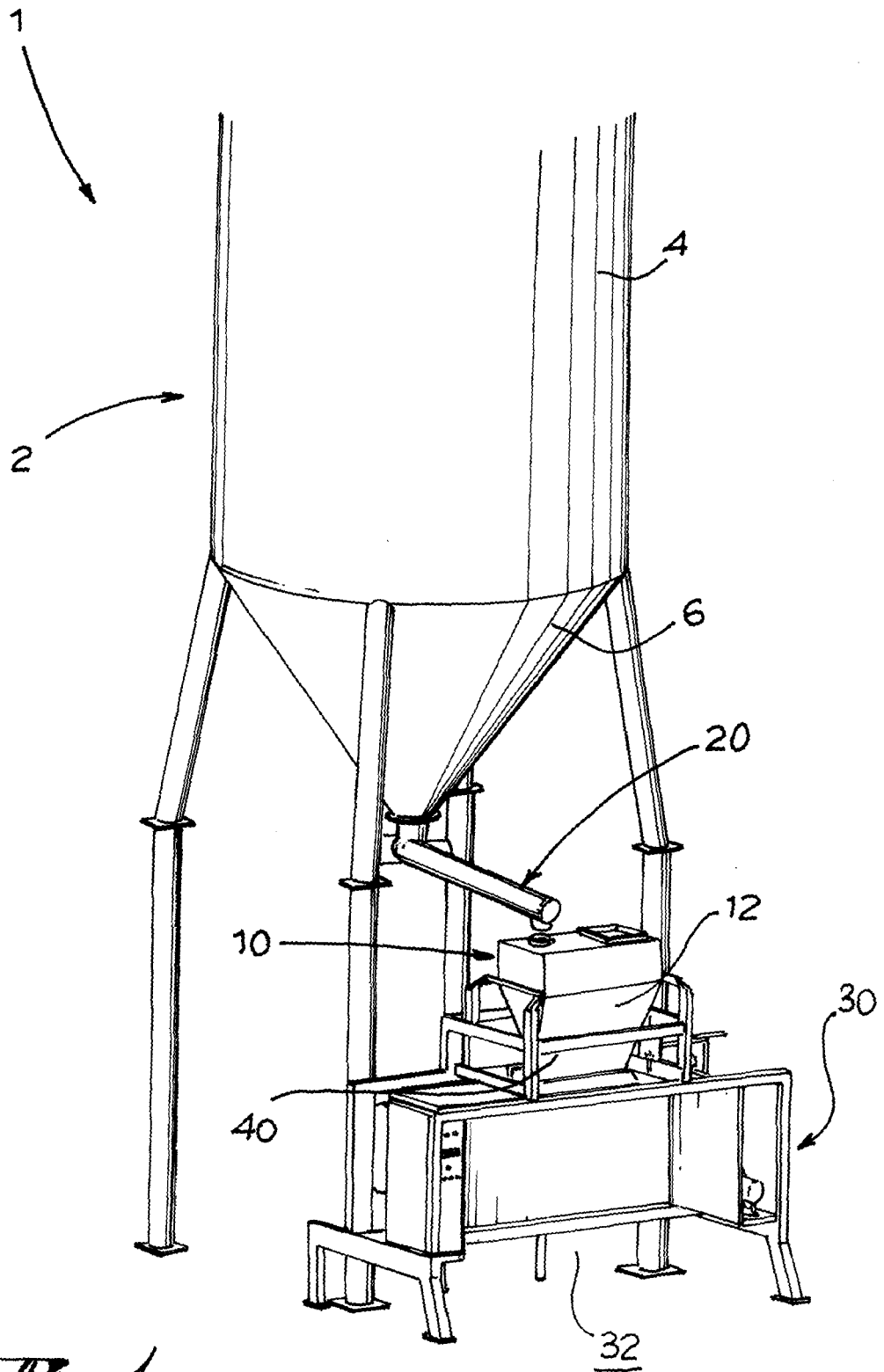


Fig. 1

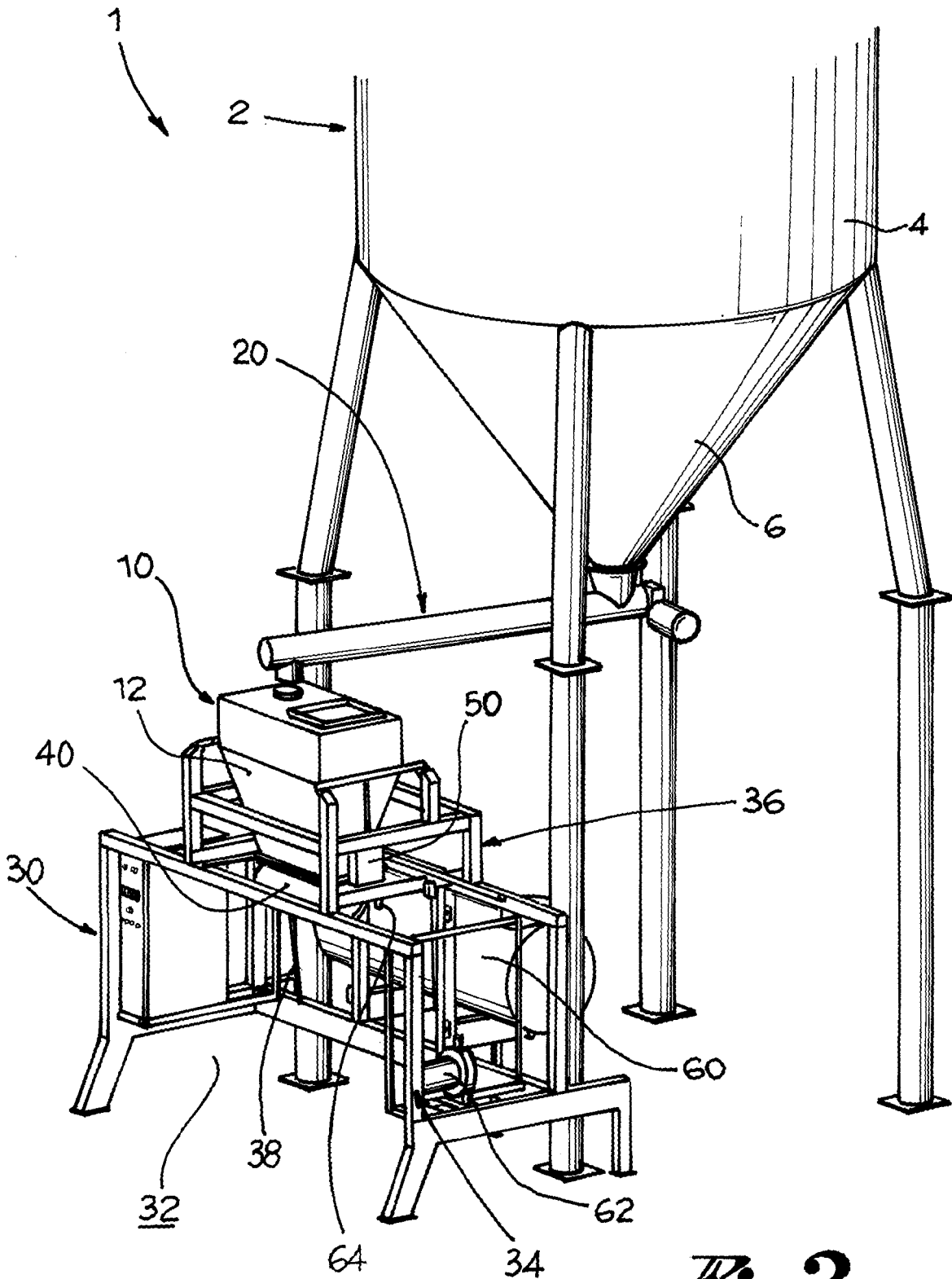


Fig. 2

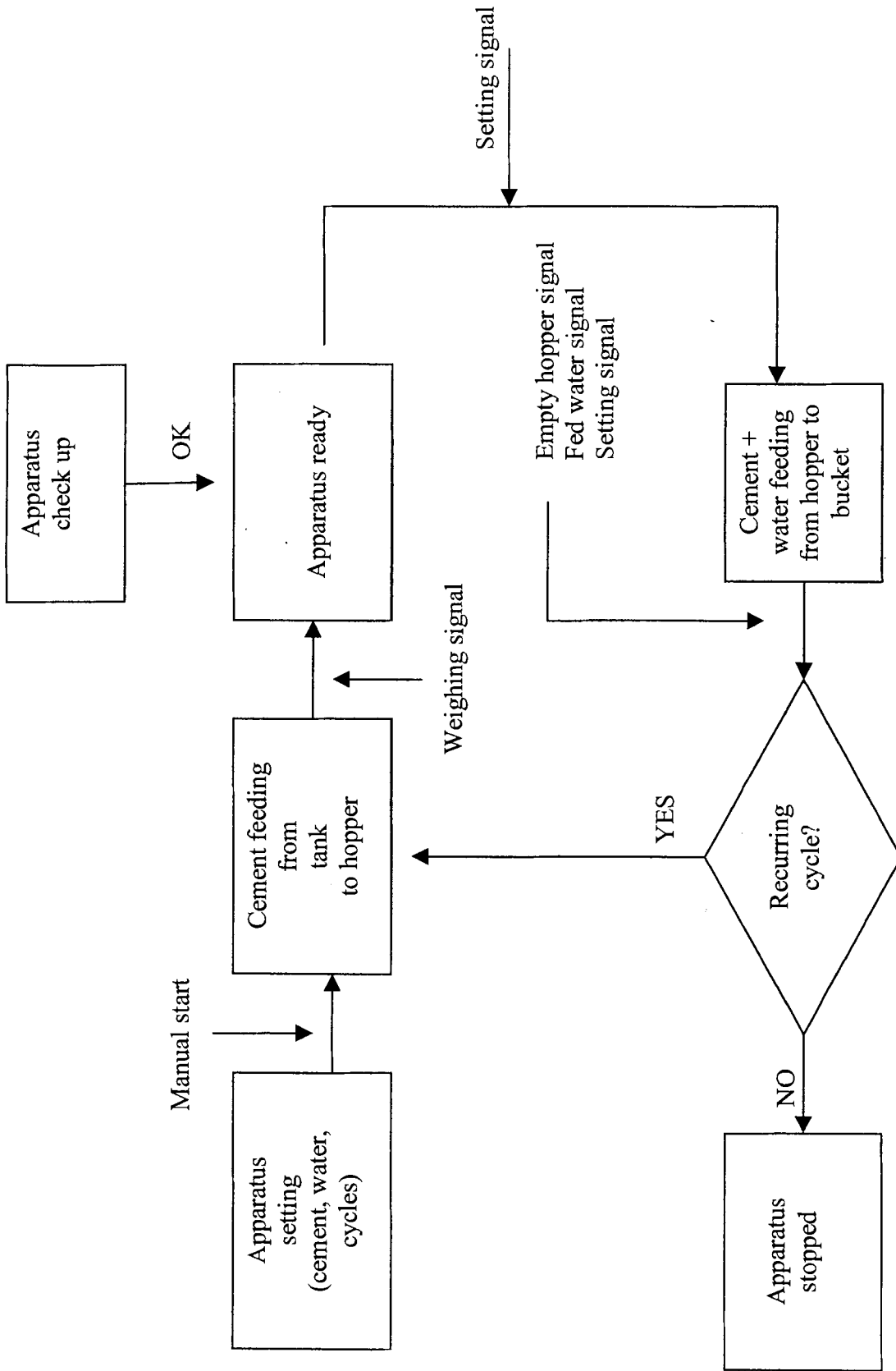


FIG. 3

REFERENCES CITED IN THE DESCRIPTION

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