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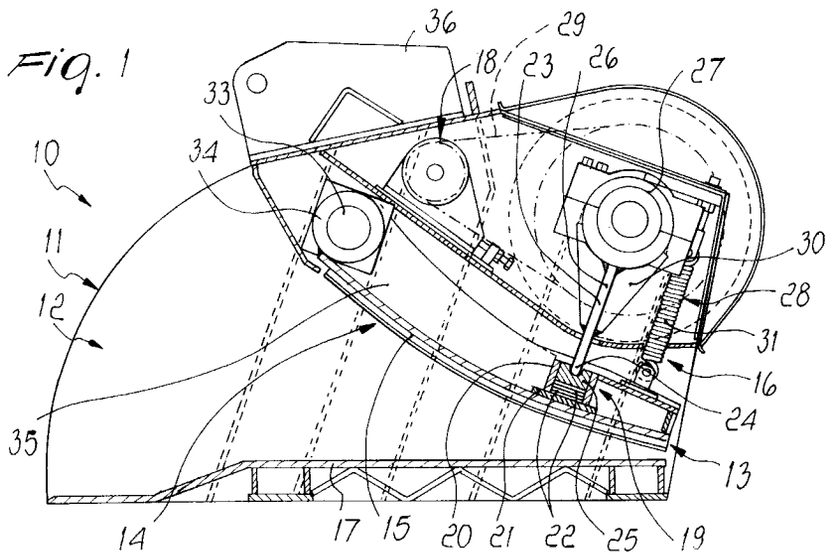
(54) Bucket for crushing and screening rubble or stones

(57) A bucket (10), particularly for crushing and screening rubble or similar stony material, comprising a box-like structure (11) which can be articulated to movement arms of self-propelled vehicles and is open at a first side (12), which is arranged frontally with respect to the advancement direction when picking up the rubble, and at a second side (13), being aligned with the first side, for the exit of the crushed and screened rubble. A crushing and screening unit (14) is supported inside the box-like (11) structure and comprises a movable crushing plate (15) being pivoted to a region which is arranged at the first side (12) and is free to oscillate under the control of actuation/vibration means (16), the plate forming, together with a wall (17) of the structure (11) which lies opposite thereto, a hopper whose oputput section can be adjusted, at the second side, so as to allow the screening of the rubble while it is being crushed, motor means (18) being provided which are suitable to drive the actuation/vibration means (16), the arms being suitable to change the box-like structure from a configuration for picking up the rubble, in which the first side is arranged frontally with respect to the advancement direction, to a crushing/screening configuration, in which the first and second sides (12,13) are arranged vertically, the second side (13) being arranged below so as to allow the rubble being crushed to fall by gravity, and vice versa.

Fig. 1



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Description

[0001] The present invention relates to a bucket particularly but not exclusively useful for crushing and screening rubble or similar stony material.

[0002] It is known that extraction from a quarry of rubble having specific sizes, to be used in ballasts, backfills or concretes, requires such rubble to be reduced according to such sizes.

[0003] In particular, the rubble or similar stony material must not only be crushed but also be screened, thus allowing to extract from the quarry and prepare different sizes suitable for the most disparate fields of application.

[0004] Currently, quarries are equipped with machines being dedicated exclusively to crushing and screening rubble and being fed by self-propelled vehicles which pick up the rubble by means of buckets.

[0005] However, it is evident that crushing and screening process, besides requiring various kinds of machines, entails a first step for loading such machines and a second step in which such machines get ready to crush and screen the rubble.

[0006] The aim of the present invention is to provide a bucket, particularly for crushing and screening rubble or similar stony material, which solves the above mentioned drawbacks of currently available methods and machines, particularly eliminating the need, at least when there is no need to provide very large amounts of material, to use dedicated machines, skipping in practice the rubble loading step.

[0007] Within this aim, an important object of the present invention is to provide a bucket which achieves high levels of flexibility and cost-effectiveness in the crushing and screening of rubble or similar stony material.

[0008] Another object of the present invention is to provide a bucket which can be applied to the most disparate types of self-propelled vehicles and can be produced in the most disparate sizes so as to meet practically with any production requirement.

[0009] Another object of the present invention is to provide a bucket which is particularly sturdy and suitable even for long and intensive load cycles.

[0010] Not the least object of the present invention is to provide a bucket which can be manufactured with known technologies and equipment.

[0011] This aim and these and other objects which will become better apparent hereinafter are achieved by a bucket, particularly for crushing and screening rubble or similar stony material, characterized in that it comprises a box-like structure which can be articulated to movement arms of self-propelled vehicles, said structure being open at a first side, being arranged frontally with respect to the advancement direction when picking up the rubble, and at a second side, lying opposite the first side, for the exit of the crushed and screened rubble, a crushing and screening unit being supported inside said structure and comprising a movable crushing plate being pivoted to a region of said structure which is arranged at said first side and is free to oscillate under the control of actuation/vibration means, said plate forming, together with a wall of said structure which lies opposite thereto, a hopper whose output section can be adjusted, at said second side, so as to allow the screening of the rubble while it is being crushed, motor means being provided which are suitable to drive said actuation/vibration means.

[0012] Further characteristics and advantages of the present invention will become better apparent from the description of an embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a sectional side view of a bucket according to the invention;
Figure 2 is a top view, in section and partly broken of the bucket of Figure 1.

[0013] With reference to Figures 1 and 2, a bucket, particularly for crushing and screening rubble or similar stony material, according to the invention, is generally designated by the reference numeral 10.

[0014] The bucket 10 comprises a box-like structure 11 which can be articulated to movement arms of self-propelled vehicles, not shown; the structure 11 is open at a first side 12, which is arranged frontally with respect to the advancement direction when picking up the rubble, and at a second side 13 opposite the first side, for the exit of the crushed and screened rubble, not shown in the figures.

[0015] A crushing and screening unit, generally designated by the reference numeral 14, is supported within the structure 11 and comprises a movable crushing plate 15 being pivoted to a region of said structure 11 arranged at the first side 12 and can oscillate freely under the control of actuation/vibration means, generally designated by the reference numeral 16, and being described in greater detail hereinafter.

[0016] The plate 15 forms, together with a wall 17 of the structure 11, opposite thereto, a hopper whose output section is adjustable at the second side 13 so as to allow the screening of the rubble while it is being crushed.

[0017] Motor means, generally designated by the reference numeral 18, suitable to drive the actuation/vibration means 16, are further provided.

[0018] The arms of the self-propelled vehicle, which are not shown but are of a per se known type, are furthermore suitable to change the structure 11 from a configuration for picking up the rubble, in which the first side 12 is arranged frontally with respect to the advancement direction, to a crushing/screening configuration, in which the first and second sides, designated by the reference numerals 12 and 13 respectively, are vertically aligned, the latter being underneath, so as to allow the rubble being crushed to fall by gravity, and vice versa.

[0019] In particular, in this embodiment the actuation/vibration means 16 are associated with adjustment means, generally designated by the reference numeral 19, which are suitable to determine the extent of the oscillation range of the plate 15 as well as the output section relative to the second side 13.

[0020] In particular, the adjustment means 19 are constituted by a first bush 20 which is fixed by means of a base plate 21 to the plate 15, on the opposite side with respect to the rubble-processing side of said plate; said bush contains, in this case, four removable shims 22 in kinematic contact with said means 16.

[0021] In particular, the means 16 are constituted by a plate-like element 23 with a free end 24 in kinematic contact with a shaped block 25 which is inserted in the first bush 20 and abuts and pushes against the shims 22, while the other end 26 is fixed to an eccentric rotor 27 which is coupled to elastic return means 28 and is connected by means of a transmission 29 to the motor means 18.

[0022] In particular, the plate-like element 23 is provided with reinforcement ribbing 30, while the elastic return means are constituted by a corresponding number of helical springs 31.

[0023] In this case, the transmission 29 is of the belt type and the eccentric rotor 27 is associated with two flywheels 32.

[0024] The plate 15 is associated, in this case, with a pivoting shaft 33 being inserted in second openable bushes 34 which are fixed on opposite sides of the structure 11.

[0025] The plate 15 also has reinforcement ribbings 35.

[0026] The motor means, in this case, are constituted by a hydraulic motor; the structure 11 is further provided with external brackets 36 for pivoting to said movement arms, which are not shown.

[0027] In practice, the operation of the bucket 10 is as follows. During the loading step, the bucket 10 is arranged by the movement arms so that its first side 12 is arranged frontally with respect to the advancement direction, so as to be able to load a preset amount of rubble.

[0028] After loading a given amount of rubble, the bucket 10 is raised and placed so that the first side 12 and the second side 13 are vertically aligned with the latter being underneath.

[0029] In this position, the actuation/vibration means 16 are activated and, by moving the plate 15, crush the rubble, which by descending substantially along the hopper formed by said plate and by the opposite wall 17, arrives at the opening formed in the second side 13.

[0030] An appropriate adjustment of the means 16 also determines the opening cross-section of said second side 13, thus allowing rubble of a given size to fall by gravity.

[0031] In practice, it has been observed that the present invention has achieved the intended aim and objects.

[0032] Attention is in fact called to the easy use of the bucket according to the invention, which combines the typical pick-up functions of the conventional bucket and the crushing and screening functions typical of dedicated machines.

[0033] Finally, it should be noted that the bucket according to the invention allows to completely avoid the step of loading another machine provided specifically for screening and crushing operations.

[0034] As a result, cost savings, in purchasing terms as well as in terms of process and maintenance times, clearly appears.

[0035] It should also be observed that since the structure of the bucket according to the invention is not particularly complicated, it can be advantageously used in various application situations and with great flexibility.

[0036] The present invention is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0037] The technical details may be replaced with other technically equivalent elements.

[0038] The materials and the dimensions may be any according to requirements.

[0039] The disclosures in Italian Patent Application No. PD2000A000069 from which this application claims priority are incorporated herein by reference.

[0040] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A bucket, particularly for crushing and screening rubble or similar stony material, **characterized in that** it comprises a box-like structure which can be articulated to movement arms of self-propelled vehicles, said structure being open at a first side, being arranged frontally with respect to the advancement direction when picking up the rubble, and at a second side, lying opposite the first side, for the exit of the crushed and screened rubble, a crushing and screening unit being supported inside said structure and comprising a movable crushing plate being pivoted to a region of said structure which is arranged at said first side and is free to oscillate under the control of actuation/vibration means, said plate forming, together with a wall of said structure which lies opposite thereto, a hopper whose output section can be adjusted, at said second side, so as to allow the screening of the rubble while it is being crushed, motor means being provided which are suitable to drive said actuation/vibration means.

2. The bucket according to claim 1, **characterized in that** said actuation means are associated with adjustment means suitable to determine the extent of the oscillation range of said plate and of said output section relative to said second side.

3. The bucket according to one or more of the preceding claims, **characterized in that** said adjustment means comprise a first bush fixed by means of a base plate to said crushing plate, on the opposite side with respect to the rubble-processing side of said plate, said first bush containing one or more removable shims which are in kinematic contact with said actuation/vibration means.

4. The bucket according to one or more of the preceding claims, **characterized in that** said actuation means comprise a plate-like element with a free end being in kinematic contact with a shaped block which is inserted in said first bush and abuts and pushes against said one or more shims, while the other end is fixed to an eccentric rotor which is coupled to elastic return means and is connected to said motors by way of a transmission.

5. The bucket according to one or more of the preceding claims, **characterized in that** said eccentric rotor is associated with one or more flywheels in order to smoothen its motion.

6. The bucket according to one or more of the preceding claims, **characterized in that** said plate-like element is provided with reinforcement ribbings.

7. The bucket according to one or more of the preceding claims, **characterized in that** said elastic return means are constituted by one or more helical springs.

8. The bucket according to one or more of the preceding claims, **characterized in that** said rotor is connected to said motor means by way of a belt drive.

9. The bucket according to one or more of the preceding claims, **characterized in that** said crushing plate is provided with a pivoting shaft being inserted in second openable bushes which are fixed on opposite sides of said structure.

10. The bucket according to one or more of the preceding claims, **characterized in that** said plate comprises reinforcement ribbings.

11. The bucket according to one or more of the preceding claims, **characterized in that** said motor means comprise a hydraulic motor.

12. The bucket according to one or more of the preceding claims, **characterized in that** said structure is externally provided with brackets for pivoting to said movement arms.

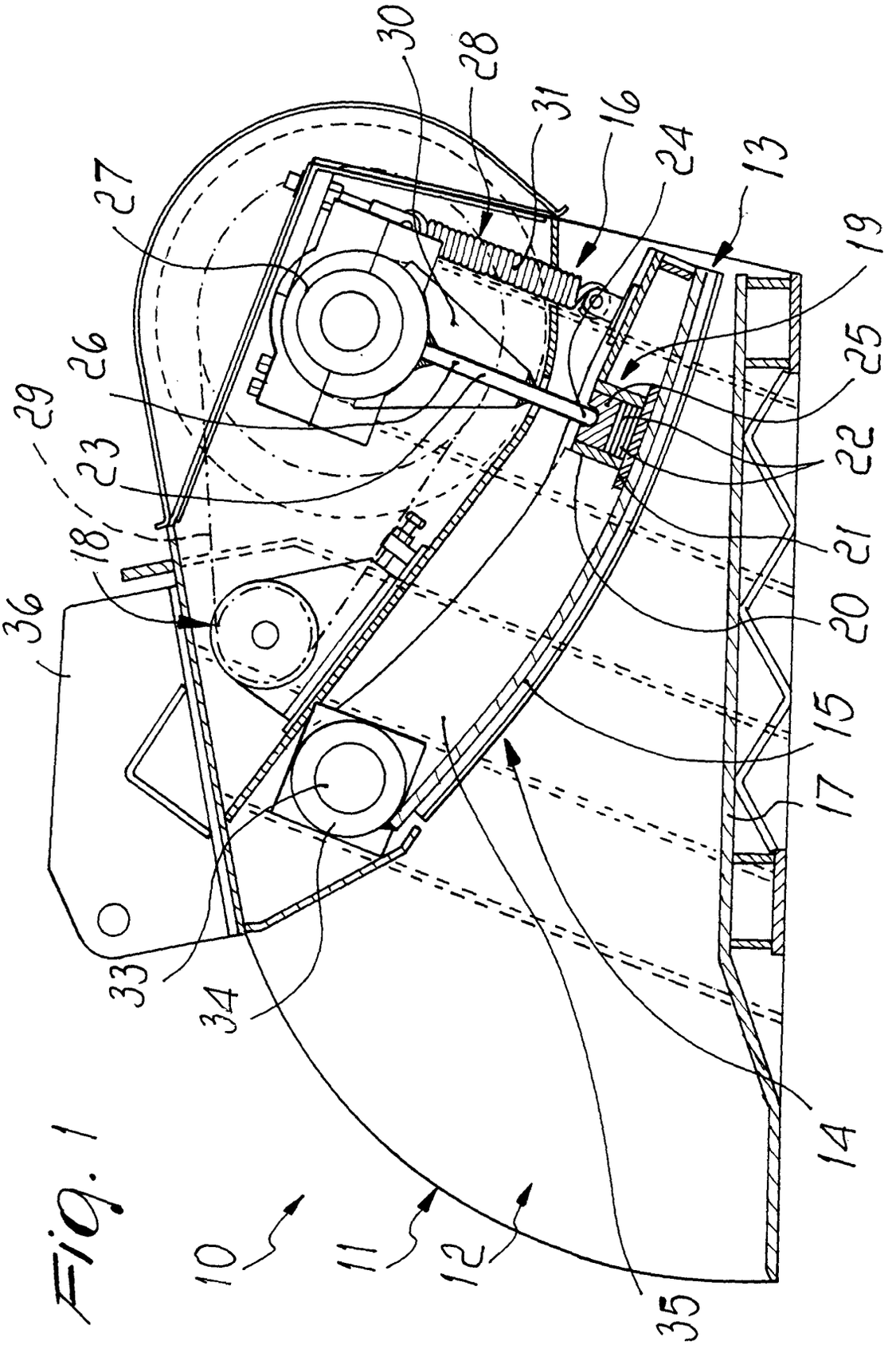
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Fig. 1

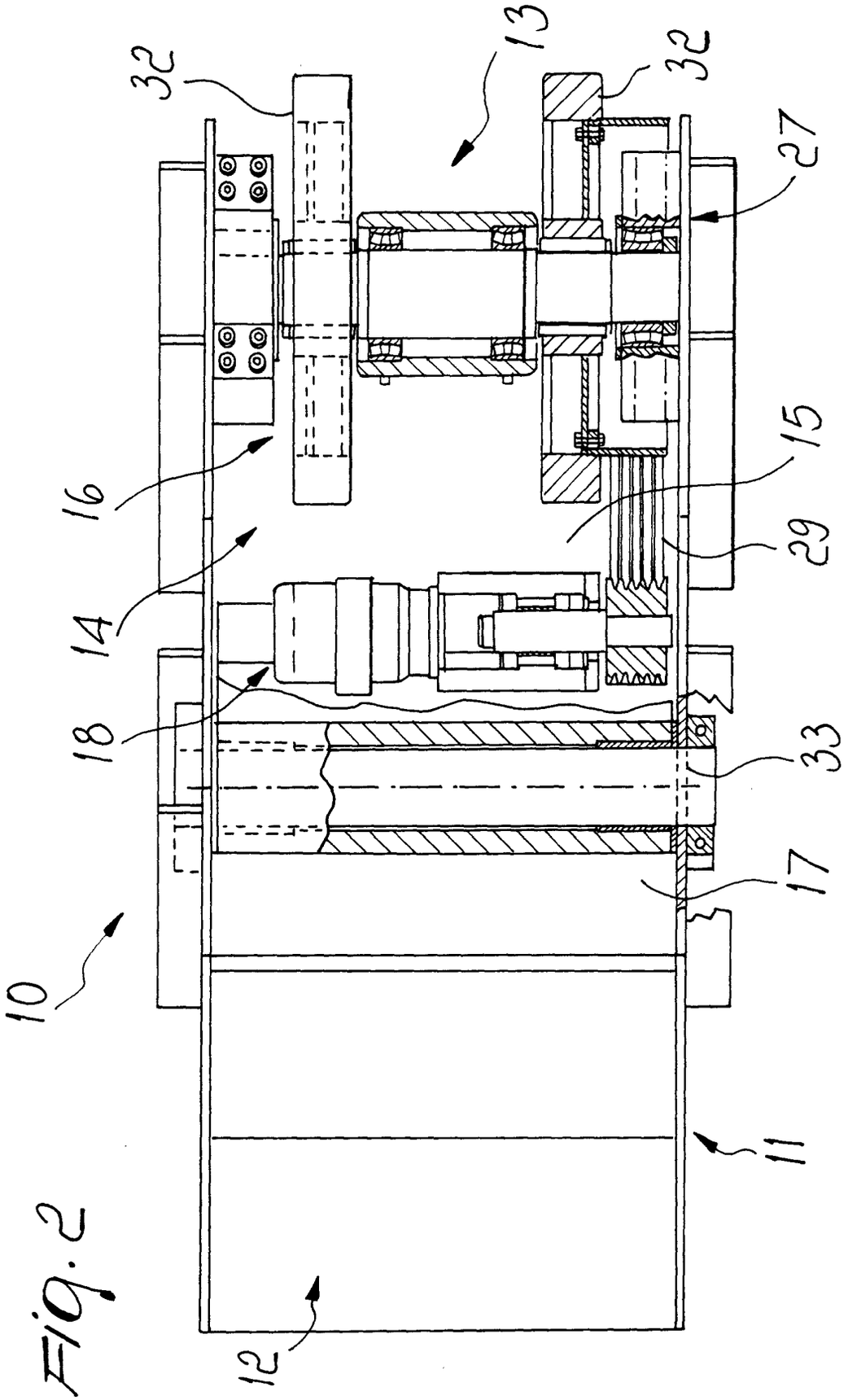

Fig. 2