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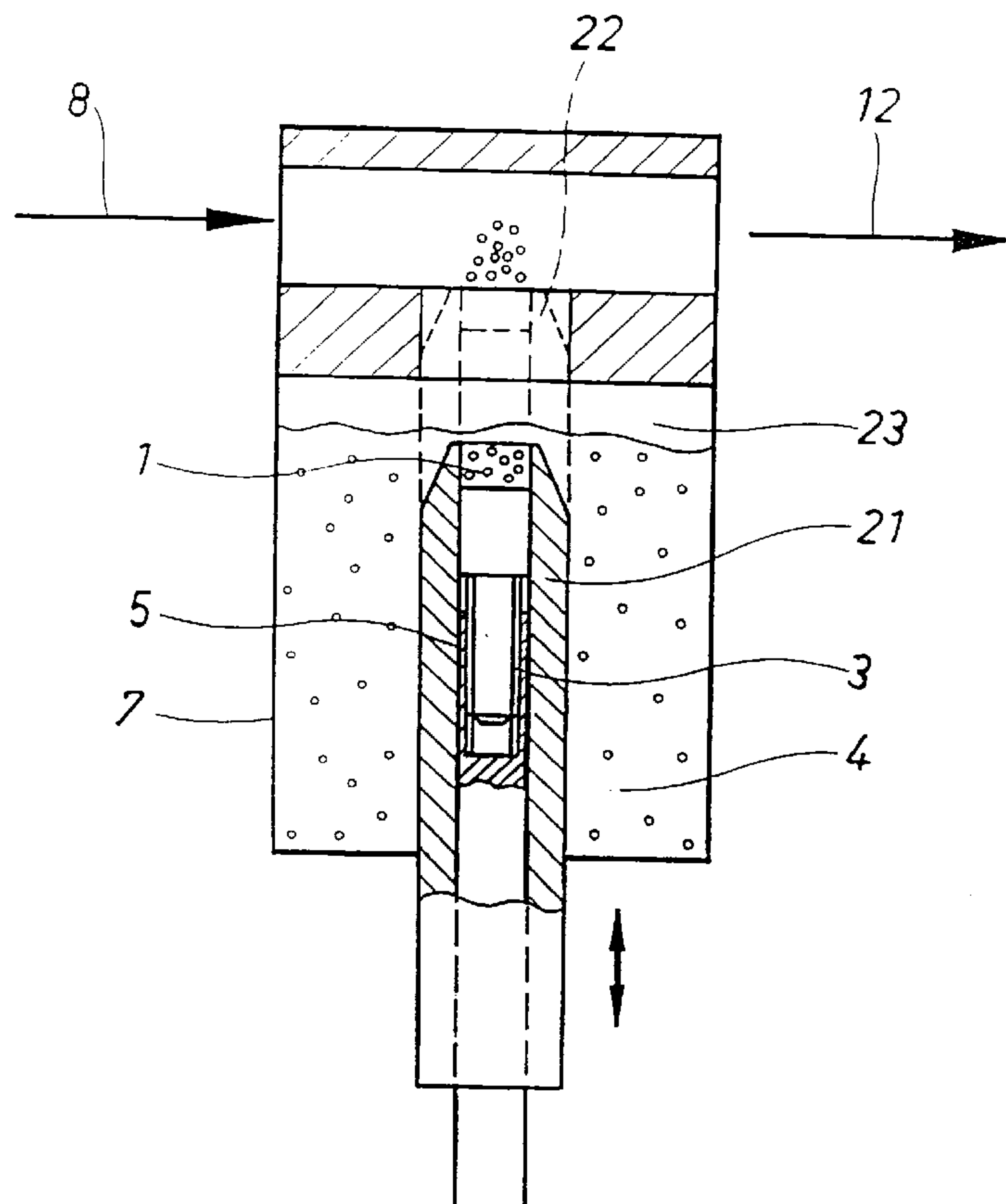
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(54) **PROCEDE ET DISPOSITIF D'ENSEMENCEMENT**

(54) **SEEDING METHOD AND APPARATUS**



(57) L'invention concerne un procédé et un dispositif servant à ensemercer un sol (2) avec des semences (1). Celles-ci sont déposées avec précision sur le sol sélectionné (2) au moyen d'un tuyau (12) expulsant de l'air comprimé (8) à vitesse élevée (11). Les semences peuvent être enterrées partiellement dans le sol, afin de faciliter une croissance initiale rapide. Le conducteur de la machine d'ensemencement (10) déclenche chaque opération d'ensemencement et, si nécessaire, sélectionne le calibre des semences.

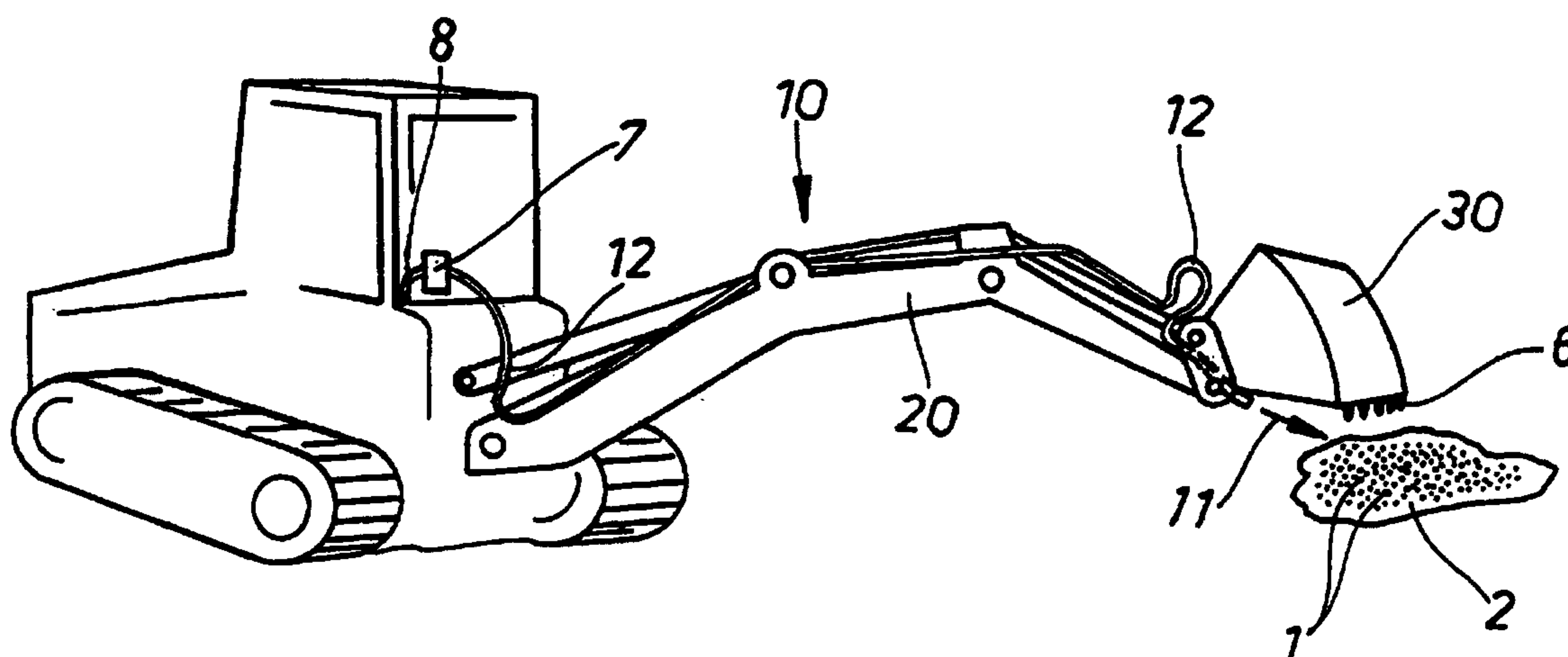
(57) The invention relates to a method and apparatus for carrying out the sowing of seeds (1) on a soil (2). The seeds are shot by means of a compressed-air pulse (8) and a compressed-air tube (12) at a high velocity (11) accurately onto the selected soil (2), which can be delicately crumbled. The seeds may be partially buried in the soil for facilitating a brisk initial growth. The operator of a machine (10) releases every sowing action and, if desired, selects the grade of seeds.





## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <b>(21) International Application Number:</b> PCT/FI95/00488<br><b>(22) International Filing Date:</b> 8 September 1995 (08.09.95)<br><b>(30) Priority Data:</b><br>944122 8 September 1994 (08.09.94) FI<br><b>(71)(72) Applicant and Inventor:</b> SIRKKALA, Juha [FI/FI];<br>Kokkilantie 6, FIN-15540 Villähde (FI).<br><b>(74) Agent:</b> LEITZINGER OY; Ruoholahdenkatu 8, FIN-00180<br>Helsinki (FI). |           | <b>(81) Designated States:</b> AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).<br><b>0 2 1 9 9 3 6 4</b><br><b>Published</b><br><i>With international search report.</i><br><i>In English translation (filed in Finnish).</i> |

**(54) Title:** SEEDING METHOD AND APPARATUS**(57) Abstract**

The invention relates to a method and apparatus for carrying out the sowing of seeds (1) on a soil (2). The seeds are shot by means of a compressed-air pulse (8) and a compressed-air tube (12) at a high velocity (11) accurately onto the selected soil (2), which can be delicately crumbled. The seeds may be partially buried in the soil for facilitating a brisk initial growth. The operator of a machine (10) releases every sowing action and, if desired, selects the grade of seeds.

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## SEEDING METHOD AND APPARATUS.

5 The present invention relates to carrying out the sowing of seeds on a desired soil as set forth in claim 1. The invention relates also to a sowing apparatus for carrying out the method.

10 It is prior known to carry out the sowing in such a manner that the seeds are strewn on the soil by means of free fall or a weak air flow. Thus, the seeds can e.g. be dropped through a seed container gate onto the soil. This type of sowing method is described e.g. in the magazine "Koneviesti", No. 3, Aug. 5, 1994.

15 A drawback in the prior known sowing methods is the slowness of sowing, some of the seeds landing in a wrong place e.g. by the wind, as well as a poor germinating capacity. Another drawback in the prior known sowing methods is the susceptibility to faults in varying conditions. Hence, the required  
20 equipment is also complicated, bulky and expensive. An object of this invention is to alleviate the above drawbacks and that is achieved by a method of the invention such that the seeds are shot by means of a compressed-air pulse to their destination.

25 The mechanisms intended for carrying out a method of the invention are set forth in the subsequent claims.

30 A large number of applications can be found for the invention. The accompanying figures are only intended as examples and to illustrate the mode of operating the invention.

Fig. 1 shows a sowing apparatus of the invention applied to an excavator.

35 Fig. 2 shows a seed dispenser of the invention in principle.

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The primary object of this invention is to carry out the sowing effectively and accurately in the right place. Thus, valuable seeds can be spared and the initial growth thereof can be secured as well as possible. The partial burial of seeds in the soil promotes germination. The driving of seeds into soil cavities serves the same purpose, the seeds being shot at a high velocity during planting. This provides a high working efficiency. A method of the invention can be used for carrying out sowing operations for a variety of plants, as the need may be.

Fig. 1 depicts in principle one sowing machine 10 intended for implementing a method of the invention. In this case, a forest machine of excavator type is fitted in the operator's field of vision with a seed dispenser 7, from which extends a seed delivery duct 12 along a machine's working boom 20 to the vicinity of an excavating bucket 30, wherein seeds 1 are shot from a compressed-air line at a high velocity 11 onto a soil 2. Thus, the seeds may partially bury themselves in crumbled and exposed rich soil 2. With a harrow type of crumbling tine 6 it has been possible to prepare the soil 2 for sowing by clearing the brush and by exposing the rich soil and mineral soil from below a layer of hay.

After the soil 2 has been prepared, the operator releases a compressed-air pulse 8, the seeds discharging at a high velocity along the compressed-air duct 12 in the form of a desired shower of seeds 11 accurately to a selected destination. The sowing machine 10 is capable of operating from a single location over a wide range.

Fig. 2 depicts one seed dispenser 7 according to the invention. Following the preceding sowing procedure, the compressed-air pulse 8 can be used for simultaneously loading the dispenser 7 with fresh seeds 1 for another sowing operation. The compressed-air pulse 8 is capable of momentarily placing a metering piston 21 lower in a seed container 4

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and, upon rising to a top position 22, a new batch of seeds can be brought up into the compressed-air duct 12 for the next sowing operation. The amount of seeds can be adjusted to be greater or smaller by varying the vertical position of a regulating piston 3 by means of threads 5. After the next sowing operation, the metering piston 21 revisits the lower position in the bulk of seeds 4. Thus, an air space 23 above the metering piston 21 assists by dropping the extra seeds 1 back into the seed chamber 4.

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A sowing method of the invention is particularly intended for supplementary or reforestation e.g. after loggings or forest disasters. According to the invention, the sowing can be carried out with a lot less damage to the nature than in traditional methods. Just a very thin layer of topsoil is removed. Forest clearings or other invasive actions are not needed but the sowing can be effected on precisely selected, rather small-area pieces of soil 2, which can be placed e.g. between growing trees or other selected positions with just a delicate working of the soil. Thus, the novel method is ecologically beneficial.

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If desired, the equipment of the invention can be fitted as accessories to traditional forest machines. The compressed air can be produced by means of a small pneumatic compressor. When pressing the release mechanism, the dispensing piston 3 can be automatically controlled to always visit the bottom position and to rise back to the top position along with the seeds in anticipation of another release effected by the operator with the compressed air 8.

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The sowing of the invention can be carried out quickly e.g. after a logging operation when the soil is still moist and the growth picks up well.

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A method of the invention can be readily used for replacing the seeds with another variety as the dispenser, along with

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the seeds contained therein, is readily replaceable and detectable within the operator's field of vision. A method of the invention can also be used for carrying out sowing operations for other purposes, e.g. in agriculture, environmental service, landscaping and gardening. Every sowing procedure can be automatically counted from compressed-air pulses.

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Claims

1. A method for carrying out the sowing of seeds (1) on a desired soil (2) the method including the steps of
- 5 - dispensing a number of seeds (1) into a compressed-air duct (12); and
- shooting the said number of seeds (1) quickly onto the soil (2) by means of a compressed-air pulse;
- c h a r a c t e r i z e d by further steps of
- 10 - dispensing the seeds by transferring a measured amount of seeds from a seed chamber (4) to the compressed-air duct (12) by means of a reciprocating piston (21) having an adjustable seed amount metering space for receiving the said measured amount of seeds; and
- 15 - controlling each reciprocating movement of said piston (21) by each release of said compressed-air pulses.
2. A method as set forth in claim 1, c h a r a c t e r - i z e d in that the compressed-air pulses are released by
- 20 the operator.
3. A sowing apparatus for carrying out a method as set forth in claim 1 or 2, said apparatus comprising
- a seed dispenser (7);
- 25 - a compressed-air duct (12) extending from the dispenser to a sowing site;
- means for producing repeated compressed-air pulses for delivering seeds (1) along the compressed-air duct (12) from the dispenser (7) to a destination (2),
- 30 c h a r a c t e r i z e d in that the dispenser (7) includes a reciprocating dispensing and metering piston (21) having an adjustable seed amount metering space for picking up a desired amount of seeds (1) at a time from a seed container (4) into the compressed-air tube (12).
- 35
4. A sowing apparatus as set forth in claim 3, c h a r -

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5 a c t e r i z e d in that the dispenser (7) includes a  
release mechanism for the compressed air, the said release  
mechanism automatically controlling the reciprocating move-  
ment of the dispensing and metering piston (21) between its  
bottom and top positions.

10 5. A sowing apparatus as set forth in claim 4, c h a r -  
a c t e r i z e d in that the release mechanism can be  
effected by the operator for releasing the compressed-air  
pulses.

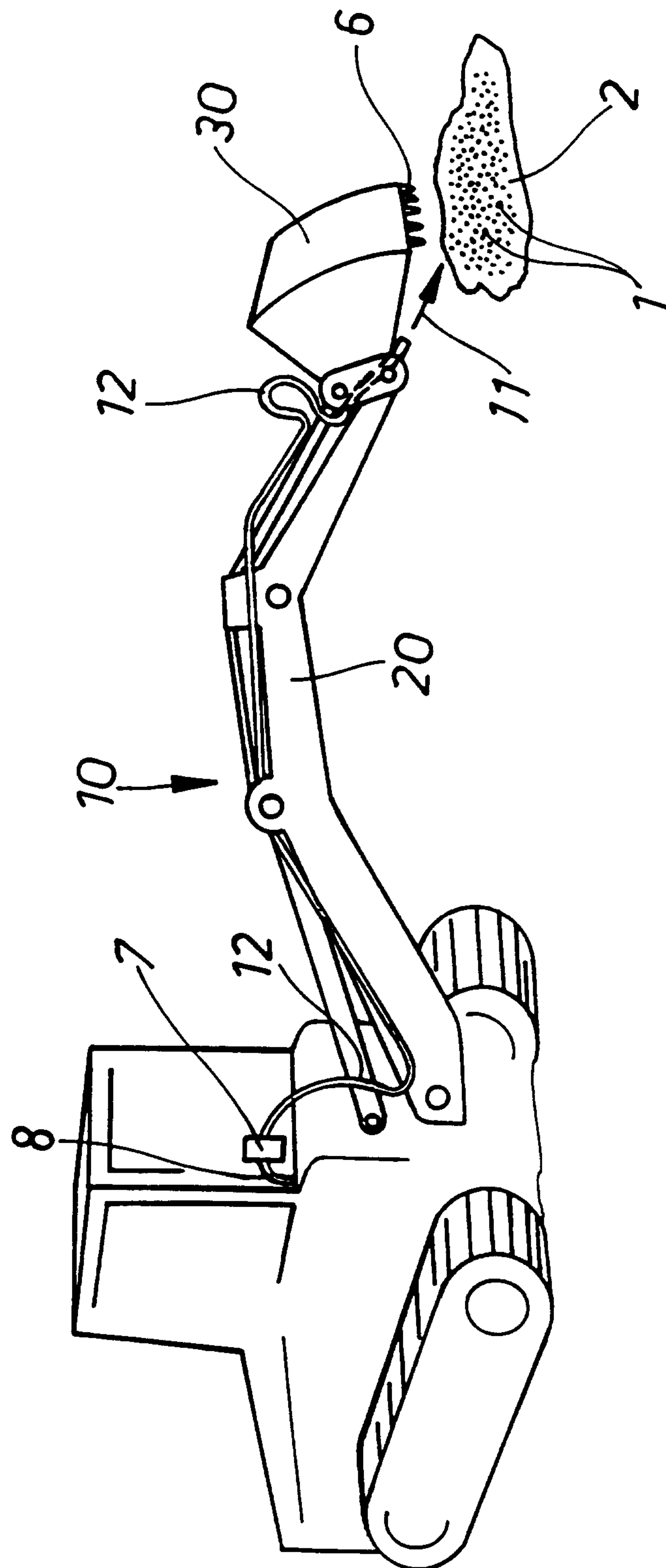
15 6. A sowing apparatus as set forth in any of claims 3-5, c  
h a r - a c t e r i z e d in that the dispenser (7) is  
located within the field of vision of the operator of the  
sowing apparatus for monitoring the amount and grade of  
seeds (1) to be sown at a time.

20 7. A sowing apparatus as set forth in claim 4, c h a r -  
a c t e r i z e d in that each release of compressed-air  
pulse (8, 11, 12) is counted by means of a separate counter  
for monitoring the number of sowing procedures.

25 8. A sowing apparatus as set forth in claim 3, c h a r -  
a c t e r i z e d in that the machine includes a working  
boom (20), having its end fitted with an excavating bucket  
(30) for the wind protection and increased extent of a  
sowing operation (11).

30 9. A sowing apparatus as set forth in claim 8, c h a r -  
a c t e r i z e d in that the excavating bucket (30) is  
fitted with a harrow-type crumbling tine (6) for the soil  
(2).

35 10. A sowing apparatus as set forth in claim 5, c h a r -  
a c t e r i z e d in that the released compressed-air pulse  
(8) re-loads the metering piston (21) with seeds (1) for the  
next sowing operation.



**Fig. 1**

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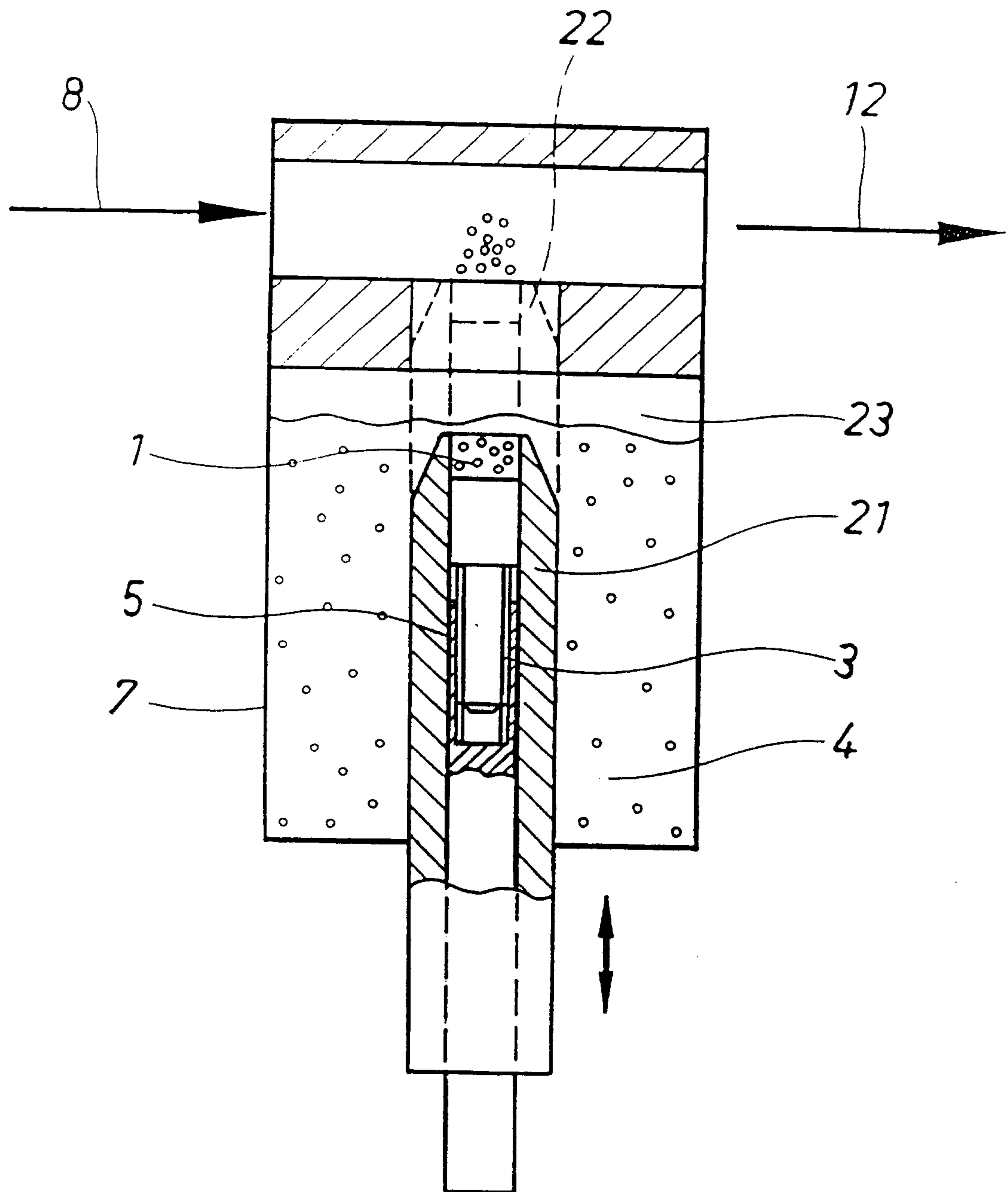


Fig. 2