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(54) **EXCAVATING BUCKET WITH A SHREDDER AND A CLASSIFIER**

(76) Inventor: **Jurgen Schenk**, Stuttgart (DE)

Correspondence Address:
RONALD S. LOMBARD
PATENTS AND TRADEMARKS
4430 TWIN OAKS DRIVE
MURRYSVILLE, PA 15668 (US)

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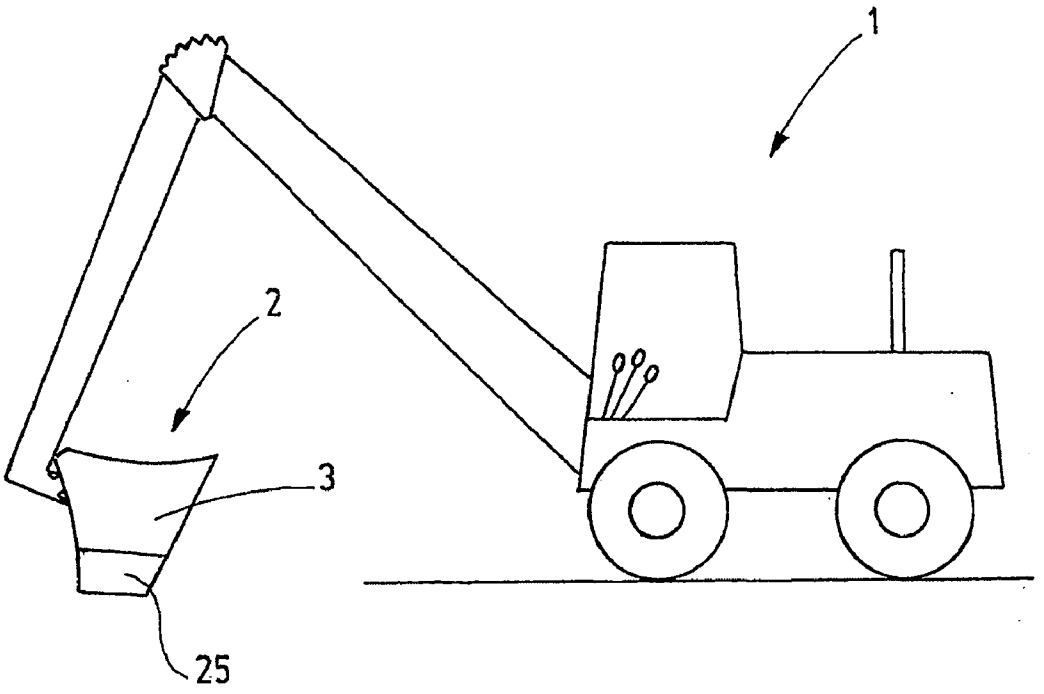
(57) **ABSTRACT**

In an excavating device for a bucket excavator wherein the excavating device is supported by a carrier and has a reception chamber with an inlet opening and a material through-flow opening, a shredder is arranged in the through-flow opening, and a classifier is arranged outside the reception chamber below the through-flow opening and is mounted to the bucket.



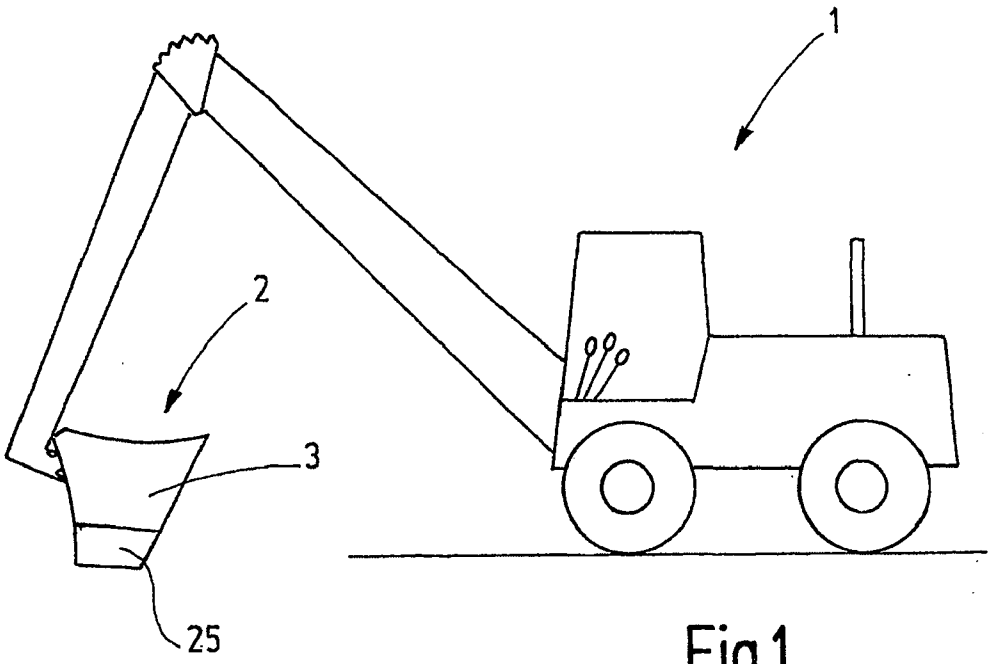


Fig.1

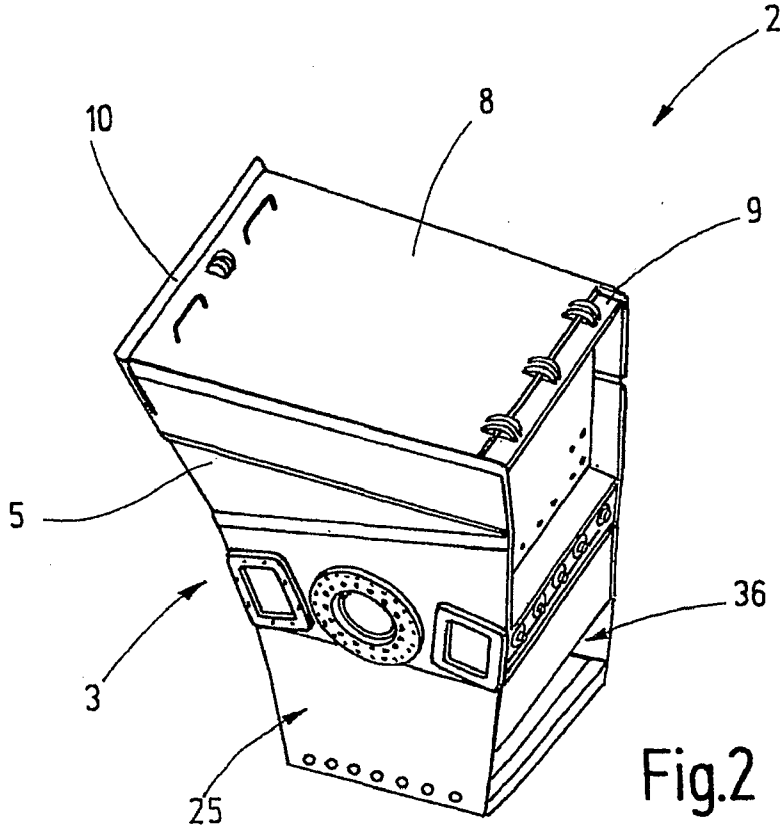


Fig.2

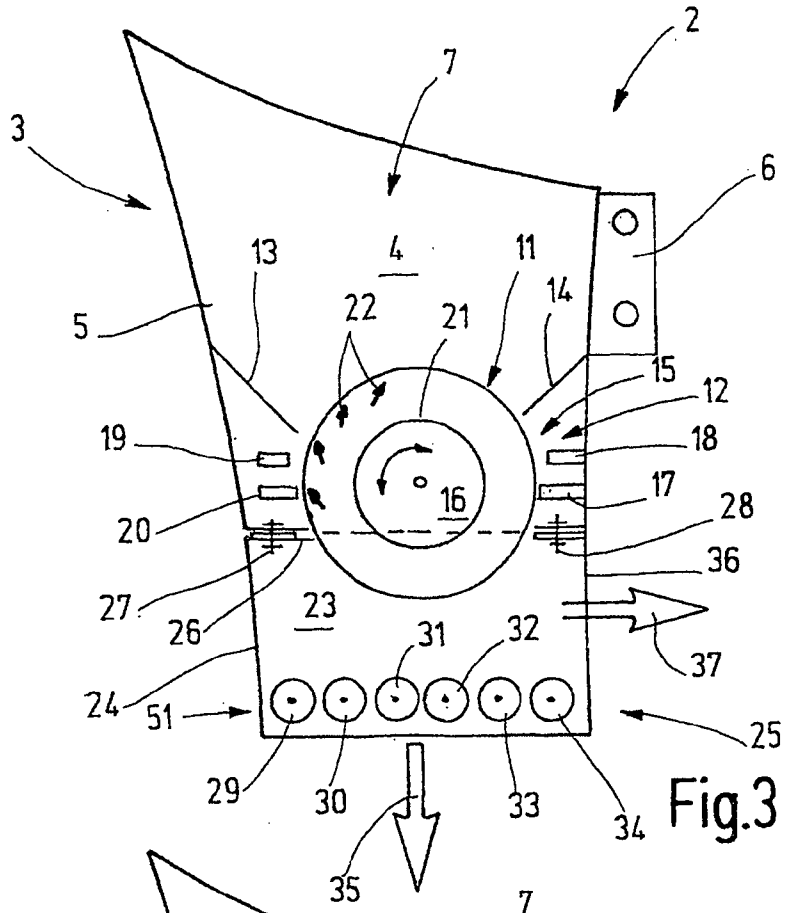

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Fig.3

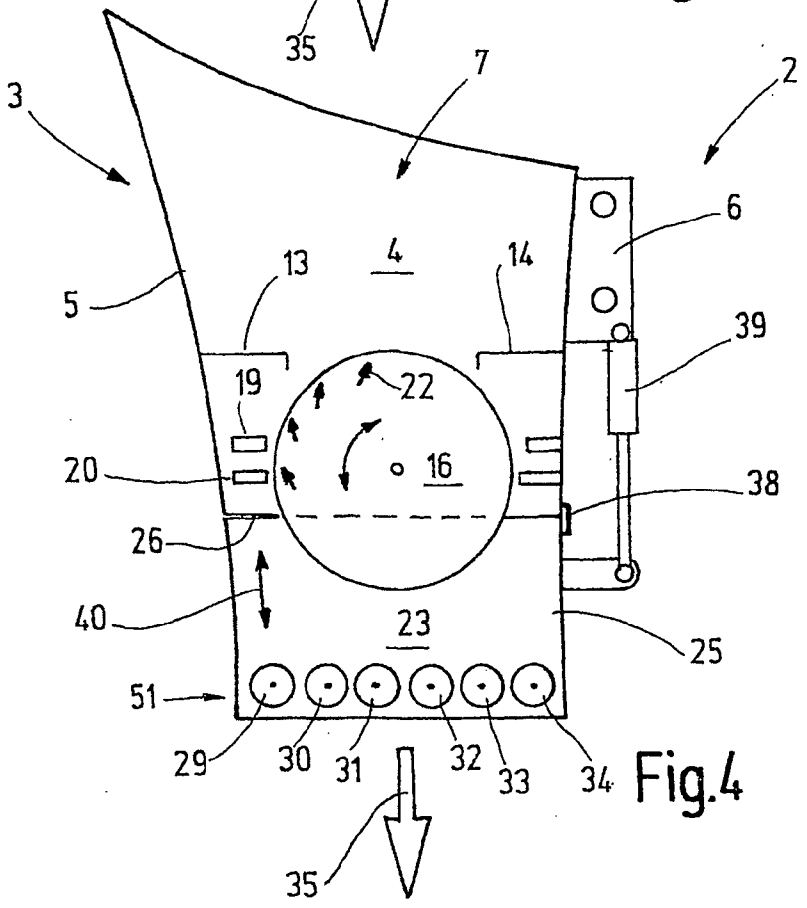
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Fig.4

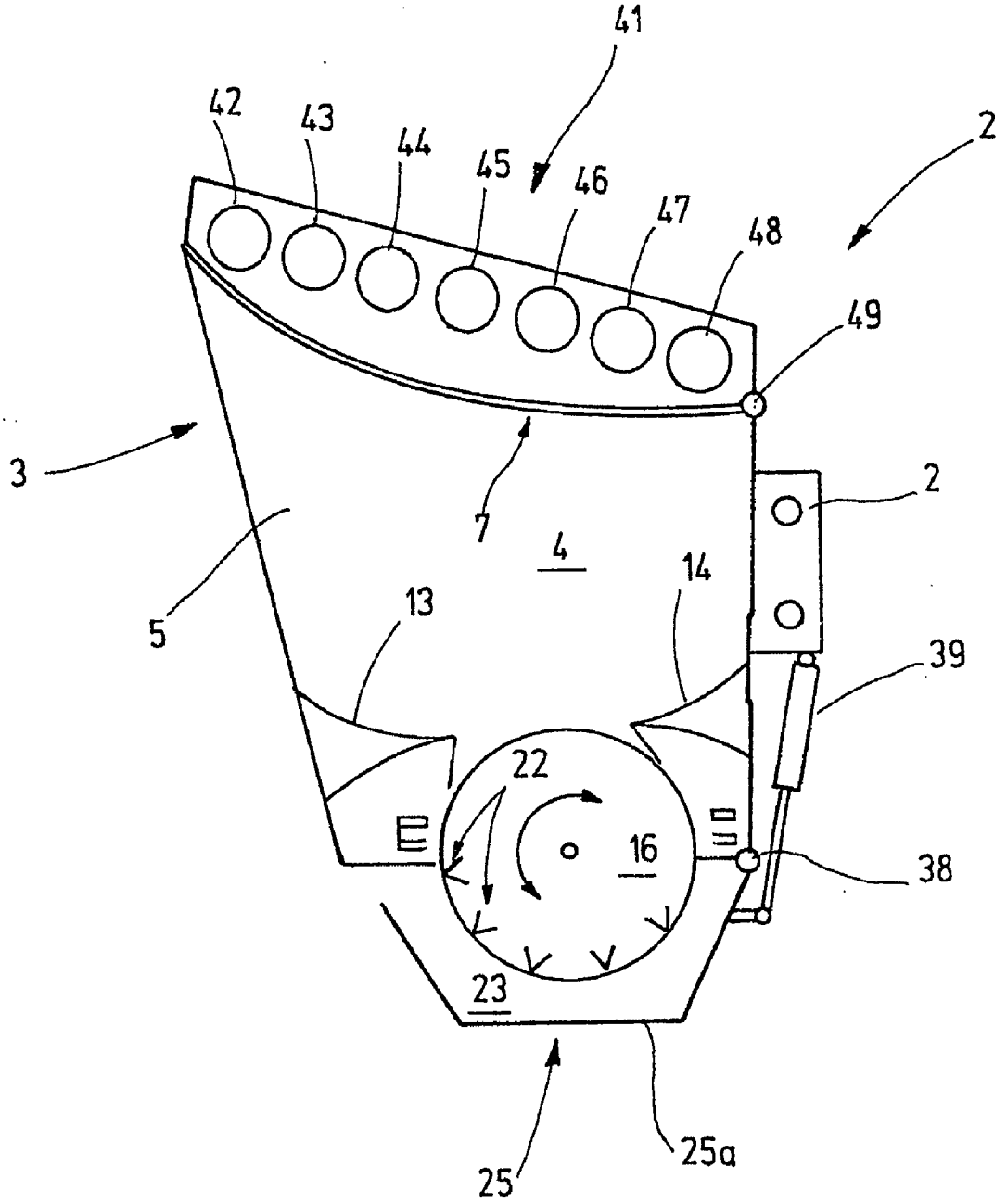

Fig.5

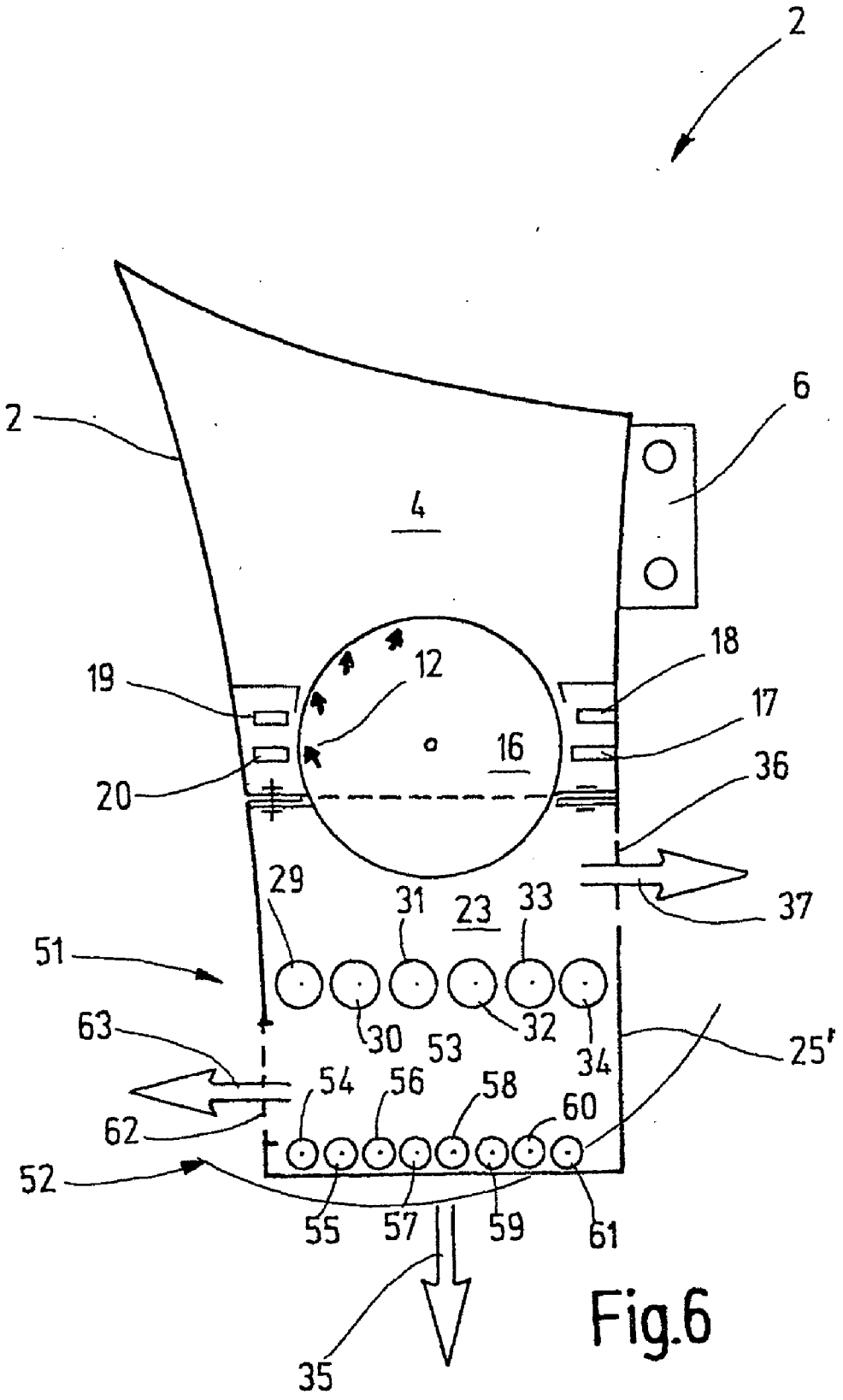
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Fig.6

EXCAVATING BUCKET WITH A SHREDDER AND A CLASSIFIER

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This is a continuation in part application of pending international application PCT/EP2006/001534 filed Feb. 21, 2006 and claiming the priority of German Application No. 10 2005 011 964.6 filed Mar. 14, 2005.

BACKGROUND OF THE INVENTION

[0002] The invention relates to an excavator bucket preferably with a shredder and also with a classifier for an excavating machine, a wheel loader or a similar machine with a bucket supported by the machine.

[0003] EP 1147265 B1 discloses a ditch digging device with an interior space and a digging opening. Furthermore, it includes a material passage with a cutting device, for example, in the form of a hydraulically driven device cutter provided with cutting teeth. The cutting device forms a comminuting arrangement. In the material passage, a classifying device in the form of a sieve may be arranged.

[0004] With this ditch digging device conventional excavating work as well as cutting procedures such as breaking up cover layers may be performed. Furthermore, the sieve arranged in the material passage may provide for the classifying of materials. But, it is also easily possible to perform a material separation into coarse and fine particle materials which are deposited on different piles.

[0005] U.S. Pat. No. 4,385,732 discloses a shredder for the separation of waste materials. The shredder includes a material supply bucket which is open at its top and two shafts arranged parallel to each other and being provided with shredder discs. The shafts rotate in opposite direction. At the bottom two sieve trays can be pivoted below the shredder shafts which have teeth and passages extending between the shredder discs. The sieve trays provide for a classifying of the material shredded by the shredder.

[0006] This shredder, however, is not suitable as an attachment device for mounting on carriers, for example, for performing excavation work.

[0007] GB 2 094662 A discloses a shredder arrangement for relatively soft material, such as coal. The arrangement comprises two roller classifiers above which cutting devices for comminuting coal are arranged. The coal is completely broken up to a desired size as determined by the roller classifiers. Rock and wood pieces are ejected above the roller classifier.

[0008] WO 94/24376 furthermore discloses a shovel with an internal separation arrangement and an interior rod sieve. The shovel is provided at its front end with an opening through which material may enter the interior of the shovel. Below the rod sieve there is a hydraulically operable flap via which material pushed through the rod sieve can leave the shovel.

[0009] The use of this shovel is limited to the accommodation and processing of material which is not too solid.

[0010] It is the object of the present invention to provide an excavation machine, for example, an excavator, a wheel loader or another carrier apparatus which permits various applications.

SUMMARY OF THE INVENTION

[0011] In an excavating device for a bucket excavator wherein the excavating device is supported by a carrier and has a reception chamber with an inlet opening and a material through-flow opening, a shredder is arranged in the through-flow opening, and a classifier is arranged outside the reception chamber below the through-flow opening and is mounted to the bucket.

[0012] In the through-flow opening, a dominating apparatus, a one- two- or multi-shaft cutter or a jaw breaker is arranged. Outside the accommodation space for the broken-up material there is a classifier arrangement which separates the material flow into at least two material flows and which, consequently, permits the establishment of different material flow fractions.

[0013] The arrangement of the classifier outside the bucket makes a wide spectrum of applications possible. Outside the bucket, there is sufficient space for larger classifiers, such as, roller classifiers or multi-stage classifiers. In a particularly advantageous embodiment, the bucket is in the form of an excavating shovel for example, in the form of a deep-bucket shovel. With such an arrangement, on one hand excavation work can be performed and, on the other hand, the collected material can be crushed and subsequently be classified. The excavating bucket is consequently a universal digging shovel. The operation, thereof, is very simple for a single operator. When the universal digging shovel is filled, it is moved to a vertical position in which the collected material slides toward the cutting device which then is operated whereupon the material, after leaving the cutter, is right away classified. For example, fine particles are permitted to drop down whereas coarse material leaving the cutter is first collected in a buffer chamber which is formed between the comminuation device and the classifier. The buffer chamber is emptied from time to time for example, by moving the shovel to another location and tilting it there to an emptying position in which the coarse particles drop out of the buffer chamber.

[0014] The operation is simple, intuitive and effective. The operation described above is particularly effective if the opening for the passage of the material is arranged opposite the excavation opening.

[0015] As shredder arrangement, a drum cutter provided with chisel bits, is particularly suitable. The chisel bits may be projecting radially from the drum or they may be inclined forwardly in the direction of rotation of the drum. Preferably, the motor of the shredder is driven by a hydraulic drive arrangement so that it can be operated at different power levels or it can be selectively shut down.

[0016] In a refined embodiment, the drive arrangement for the cutting drum or motor is operable in opposite directions. This is advantageous for freeing blockages or for generating material shredded to different particle sizes. There may be provided for example, at dramatically opposite sides of the cutting drum or at other locations, different blocking bars causing the material to be shredded to different sizes. It would be possible, for example, to arrange the blocking bars at opposite sides of the cutting drum at different distances from the drum, so that, depending on the direction of rotation of the drum, larger or smaller particle sizes can be generated. Also, the distance of the blocking bars from the drums may be adjustable.

[0017] In another advantageous embodiment, the classifier is movably supported on the excavating bucket. It may also be pivotally supported. In this way, the buffer space present between the shredder and the classifier may be accessible from without. This feature may be used for emptying the bucket. The classifier may also be pivoted away from the shredder on the bucket, so that the shredder can be used for cutting off solid adjacent materials, such as asphalt, rocks, concrete or similar materials. It is in this connection particularly advantageous if the rotor of the shredder, at least to some extent, is disposed in this housing of the classifier space. If then the classifier is pivoted away or is totally removed, part of the rotor of the shredder is exposed and, in this way, can be used for the cutting of adjacent materials.

[0018] It is also advantageous if the classifier is mounted to the excavating bucket by way of a rapid coupling structure and can be fully removed, if necessary. In connection with the earlier disclosed embodiment or arrangement of the shredder the excavating bucket can then be used as a universal device for digging, for cutting and also for classifying.

[0019] The classifying arrangement may have one or more stages. Preferably it is in the form of a roller classifier. Then it includes several rollers which are arranged in parallel spaced relationship and of which at least several are driven in a particular direction of rotation. Materials whose particle size is smaller than the gap between the rollers fall through the spaces between the rollers. Coarse materials are collected on top of the rollers in the buffer space. The periodic discharge of the coarse material from the buffer space can be achieved by tilting of the bucket. While the rollers of the classifier are manually arranged in a horizontal plane, for emptying the buffer space the bucket is so tilted that the roller plane extends about vertically.

[0020] Alternatively, the buffer space can be emptied without tilting of the bucket by changing the direction of rotation of the rollers of the classifier so that the larger particles are moved sidewardly through an opening out of the bucket. The bucket may have a discharge opening with a controlled barrier, for example, a hydraulically operated flap, or the bucket may include a slide member for pushing the particles out of the buffer space. When the flap is closed, the roller classifier can be operated with changing directions of roller rotation in order to completely separate the fine particles from the material on the classifier rollers. This procedure may accordingly be used for improving the separation effectiveness of the roller classifier.

[0021] The invention will become more readily apparent from the following description of particular embodiments thereof described below in greater detail with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] FIG. **1** shows schematically an excavating machine with an excavating bucket supported by an operating arm;

[0023] FIG. **2** shows schematically an excavating bucket in a schematic perspective view;

[0024] FIG. **3** shows the excavating bucket schematically with a removable roller classifier;

[0025] FIG. **4** shows the excavating bucket schematically with a classifier which is pivotably supported and hydraulically operable;

[0026] FIG. **5** shows schematically an excavating bucket with a roller classifier arranged at the input end and a rod classifier arranged at the discharge end; and,

[0027] FIG. **6** shows schematically an excavating bucket with a removable multistage classifier.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0028] FIG. **1** shows schematically an excavating machine **1** serving as carrier for an excavating device **2** which can serve as an excavation shovel for the excavation of materials, for the processing of that material, for the processing of material already excavated, for the cutting of material still in the ground and for the classifying of the material. The excavating device **2** comprises essentially an excavating bucket **3** similar to the conventional excavating buckets. It includes, as shown in FIG. **3**, a reception chamber **4** which is surrounded by a wall arrangement **5** (see FIG. **2**). The wall arrangement **5** includes a connecting structure **6** via which it is connected to the operating arm of the excavating machine. Above the connecting structure **6**, the wall arrangement **5** forms an excavation opening **7** which, in FIG. **2**, is closed by a lid **8**. The lid **8** is pivotally supported at a side of the bucket wall adjacent the connecting structure **6** via hinges **9**, so that the excavation opening **7** can be opened and closed manually or hydraulically-mechanically. The lid **8** may also be omitted.

[0029] At the side opposite the connecting structure **6**, the wall arrangement **5** is provided with a digging strip **10**. Alternatively individual teeth may be provided.

[0030] As shown in FIG. **3** and in all the following figures, the wall arrangement **5** has at the side opposite the excavation opening **7** a material discharge opening **11** in which or behind which a shredder or diminuation device **12** is disposed. In the different embodiments of FIGS. **3** to **6**, the material flow opening **11** is delimited by guide panels **13**, **14** which, however, are not necessary. The material flow opening **11** extends preferably over the whole width of the reception chamber **4**, but may also be narrowed down.

[0031] The shredder **12** is preferably in the form of a milling cutter **15** including at least a cutter rotor **16** and a least one impact strip **17** which is arranged at a small distance from the cutter rotor **16** and which extends preferably parallel to the axis of rotation of the motor. Additional impact strips **18**, **19**, **20** may be provided in order to improve the shredding effectiveness of the shredder **15**. The impact strips may be arranged in pairs at opposite sides of the milling cutter rotor **16**. They may also be arranged at other places at somewhat higher locations above the axes of the motor **16**. Preferably, they are adjustable and the upper impact strips **18**, **19** which are closer to the reception space **4** forms, with rotor **16**, wide gaps, whereas, the lower impact strips **17**, **20** which are arranged further remote from the reception space **4** define narrower gaps with rotor **16**. This results in a two-stage shredding procedure and can be utilized for the generation of finer particles.

[0032] The milling cutter rotor **16** is preferably a drum-type cutter. It includes a shaft **21** which is provided with diminuation tools. Those are, for example, chisels **22** which are only schematically indicated in FIG. **3** and which are supported by chisel carriers which are not shown, but which

are mounted to the shaft **21**. Alternatively toothed discs, impact strips or similar diminuation tools may be arranged on the shaft **21** or a combination of toothed discs with chisels **22** or other shredding tools may be used. The milling cutter shaft or rotor **16** may also be provided with transport means, such as, paddles, spirals or similar devices which may be used in place of, or in addition to, the shredding tools. The spiral may extend over the full length of the rotor or only over sections thereof.

[**0033**] The wall arrangement **5** extends at least around the reception space **4** and partially around the space occupied by the shredding arrangement **12**. The milling cutter rotor **16** projects downwardly from the wall arrangement **5** and extends into a buffer space **23** which is surrounded by the housing **24** of a classifier **25**. The classifier is arranged with respect to the material flow after the shredder arrangement **12** and outside the reception space **4**. The housing **24** of the classifier **25** joins with a housing seam **26**, the wall arrangement **5** wherein the housing seam **26** may be completely closed toward the outside. Alternatively, openings may be provided in the housing seams **26** which permit, for example, the inspection or observation of the milling cutter rotor **16**. The housing seam **26** may be provided with a coupling structure **27**, **28** for interconnecting the wall arrangement **5** of the excavator bucket **3** and the classifier arrangement **25**. The coupling structure **27**, **28** is formed in the most simple way by a set of bolts and nuts. Preferably, however, a hydraulic rapid clamping structure or a similar remotely operable coupling device is provided.

[**0034**] The buffer space **23** enclosed by the housing **24** is closed at the bottom by a grating formed, for example, by rollers **29** to **34**, by rods or by a parallel wire or a cross-wire sieve or a similar device. At least some of the rollers **29** to **34**, preferably all the rollers, are arranged in a roller plane **51** and rotatably driven by a drive arrangement, for example, a hydraulic drive arrangement which is however, not shown. Preferably, all the driven rollers are operated in the same rotational sense or groups thereof are driven in different directions. In a preferred embodiment, the direction of rotation is reversible that is the rollers can be rotated in either direction. Between the rollers, uniform, preferably adjustable, gaps are provided which determine the size of the particles to be permitted to pass through the grating. Below the grating, the housing **24** is open so that a material flow which is indicated by arrow **35** and which consists of fine particles, can leave the housing **24**.

[**0035**] At the back side of the excavation bucket **3**, at which the connecting structure **6** is disposed there is a discharge opening **36** which opens the buffer space **23** to the outside. The buffer space **23** has such a size that coarse particles can be collected to a certain degree above the grating formed by the rollers **29-34** without being again engaged by the shredder **12**. The coarse particles can be discharged via the discharge opening **36** to the outside as indicated by the arrow **37**. To this end, the rollers **29** to **34** which are normally rotated in a counter-clockwise direction are rotated clockwise (FIG. **3**) or alternatively or additionally the excavating bucket **2** is moved to a tilted position in which the discharge opening **36** faces downwardly.

[**0036**] The excavating device **2** is operated as follows:

[**0037**] In the state as shown in FIG. **3**, the excavating device **2** can be used for excavating soil or for the transport of heaps of material. The shredder arrangement **12** and the classifier **25** are inactive herein. The classifier **25** may remain connected to the excavator bucket **3** or it can be removed by opening the coupling structure **27**, **28**.

[**0038**] With the classifier **25** removed, the milling cutter **15** can still be used in addition to the normal excavation operation, for example, by cutting with the section of the milling cutter **16** projected from the wall arrangement **5** for soil cover layers, rocks or solid soil. This material is then shredded at the impact strips **17** to **20** and moved at least partially into the reception space **4**.

[**0039**] Furthermore, it is possible to load into the excavating bucket **3** soil or heaps of material and move it to another place or, with the milling cutter **15** operating, to cut material out of the reception space **4** which material is then collected below the milling cutter **15**.

[**0040**] If the material which was subjected in this way to the cutting procedure subsequently needs to be classified, the classifying device **25** is attached to the excavating bucket **3**. The material supplied by the milling cutter **15** is then collected in the buffer space **23**. It is now possible to classify the material also during the cutting procedure. To this end, the drive arrangement for the milling cutter **16** and a separate drive for the classifier **25** are activated simultaneously. Fine particles then drop down between the rollers **29** to **34** whereas the coarse particles are accumulated at the left in FIG. **3** above the roller **29**. In this area, the buffer space **23** may be enlarged, for example, by replacing the end roller **29** simply by a metal sheet or by providing in the housing **24** a corresponding bulge.

[**0041**] When a certain amount of coarse material has been collected in this buffer space **23** which does not pass between the rollers **29** to **34**, the coarse fraction of material can be discharged separately. To this end, the excavating bucket **2** is moved to the location where the coarse fraction is to be discharged. The milling cutter **16** can continue to operate or if material to be shredded is still in the reception space **4**, may be shut down. For discharging the coarse fraction, the rollers **29** to **34** can now be reversed, so that they rotate clockwise whereby the coarse fraction is discharged via the discharge opening **36**. Alternatively or additionally, the excavating bucket **2** can be tilted such that the coarse fraction slides downwardly out of the discharge opening **36**.

[**0042**] For classifying the material, it is also possible to alternately activate the milling cutter **15** and the classifier **25**. This may be necessary, for example, if the hydraulic power unit needed for the operation of the excavating device **2** cannot provide a sufficient amount of pressurized fluid for operating the milling cutter **15** and at the same time the classifier **25**.

[**0043**] FIG. **4** shows a modified embodiment of the excavating device **2**. The earlier description is also applicable to the embodiment according to FIG. **4** wherein the same reference numerals are used for the designation of corresponding components of the excavating device **2**. Different from the excavating device described earlier, the classifier **25** is not rigidly mounted to the bucket **3**, but is pivotally connected thereto. Preferably a hinge **49** is provided at the back end of the bucket **3** such that the hinge axis extends preferably about parallel to the axis of the milling cutter

rotor **16**. The axis of the rollers **29** to **34** of the roller classifier **25** also extend preferably parallel to the axis of the milling cutter rotor **16**. But they may also be oriented at a different angle.

[**0044**] The classifier **25** can be pivoted by means of, for example, a mechanical or hydraulic operating mechanism **39** above the hinge axis **38** which is indicated in FIG. **4** by an arrow **40**. The buffer space **23** can consequently be opened and closed by pivoting the roller classifier **25** away from, or toward, the excavating bucket **3**.

[**0045**] This feature can be used for discharging from the buffer space **23** from time to time, the coarse fraction which can not pass between the rollers **29** to **34** of the classifier. The pivoting arrangement may also be so designed that the classifier can be pivoted by about 180° or more (for example up to 270°), so that the milling cutter rotor **16** projects from the excavating bucket and can be utilized for cutting material such as asphalt or concrete layers.

[**0046**] Another modified embodiment of the excavating device **2** is shown in FIG. **5**. As far as differences are not specifically mentioned below reference is made to the above description which is based on the same reference numerals.

[**0047**] The excavating bucket **3** may be provided at its excavation opening **7** with a classifier **41** in the form, for example, of a roller classifier having driven rollers **42** to **48**. The roller classifier is pivotally supported via a hinge **49**. The pivot movement can be effected by means of a hydraulic operating mechanism which is not shown. The classifier **25** may be a rod classifier with rigid or vibrating rods **25***a* that is a rod bucket which can be pivoted by a pivoting arrangement including a hydraulic cylinder **39** toward the milling cutter **16** or away therefrom. Also in this case the advantage is obtained that, with the classifier pivoted away from the milling cutter **16**, hard materials such as concrete, asphalt or rocks can be cut by the milling cutter **16**. The classifier arrangement **25** however can be omitted in favor of the classifier arrangement **41** or vice versa.

[**0048**] As described already, in connection with the earlier embodiments the milling cutter **16** may be reversible that is it may be operated in either direction of rotation. The chisels **22** may be inclined in the direction of rotation or they may extend radially in order not to establish a preferred direction of rotation. They may also be oriented alternately forwardly and backwardly. A preferred direction of operations is not intended to be expressed in any embodiment.

[**0049**] The buffer space present in the classifier **25** can, independent of the design of the classifier **25**, be so narrow that the milling cutter rotor **16** mixes material disposed in the classifier arrangement **25**. The sieve formed from the rods **25**a can be replaced by a pivotably supported lid. In this way, a mixing device is formed. This arrangement may be provided also for all the other embodiments.

[**0050**] FIG. **6** shows a further refined embodiment of the excavating device **2** of FIG. **3**. Reference is made to the description of FIG. **3** based on the same reference numerals. The main difference between the excavating device of FIG. **6** and that of FIG. **3** resides in the number of classifier stages. The excavating device **2** according to FIG. **6** has a two-stage classifier **25'** with two roller planes **51**, **52**. While the upper roller plane **51** includes the rollers **29** to **35** as described earlier, which delimits the buffer space **23**, a second buffer space **53** is formed below the roller plane **51** which is delimited downwardly by the rollers **54** to **61**. The axis of rotation of the rollers **54** to **61** extend preferably parallel to the axis of rotation of the rollers **29** to **34**. The two roller planes may be parallel or, if desired, inclined with respect to each other. The gaps between the rollers **54** to **64** are preferably smaller than those between the rollers **29** to **34**. Both groups of rollers of the roller planes **51**, **52** can be driven by the same drive arrangement or by separate drive arrangements. In accordance therewith the rollers **29** to **34** of the roller plane **51** and the rollers **54** to **61** of the roller plane **52** are operational independently of each other. The rollers of each roller plane **51**, **52** are preferably driven in the same sense. The rollers of the first plane **51**, however, may operate in a direction opposite to the rollers **54** to **61** of the second roller plane **52**. The buffer space **53** may have a discharge opening **62** which may be disposed at the side of the bucket opposite the discharge opening **36** for the buffer space **23**. The rollers of the two roller planes are then preferably operated to rotate in opposite directions. This arrangement has the advantage that the buffer spaces **23**, **53** can be emptied separately. For emptying the buffer space **23** the excavating device **2** however, for example in FIG. **6**, is tilted clockwise so that the discharge opening **36** faces downwardly. For emptying the buffer space **53**, the excavating device **2** on the other hand is tilted counterclockwise so that the discharge opening **62** faces downwardly and the material flows out of the buffer space **53** as indicated by the arrow **63**. The excavating device **2** according to FIG. **6** can not only shred material, but it can also separate it into three different fractions which can be collected on three different piles.

[**0051**] In all the embodiments disclosed above, the classifier may alternatively be a sieve, a rod-sieve, a vibration sieve, a disc classifier or any similar classifier. In another embodiment, the excavating device **2** can be in the form of a deep pocket shovel excavating device. For certain applications a shredder is not needed, that is, the excavating device comprises only a deep pocket shovel with an auto roller classifier.

[**0052**] The excavating device **2** according to the invention comprises mainly a bucket **3** and a classifier **25** which is connected to the bucket **3**. The bucket **3** has a internal through-flow opening **11** in which a shredder **12**, preferably with rotating shredding structures or alternatively with jaw crushers or similar crushing equipment is arranged. The material passage from the reception chamber **4** to the shredder **12** is open, it does not include a classifier. The classifier which is arranged downstream of the shredder may include an interim buffer space **23** in which the coarse particle fraction is stored. Means are provided for emptying the buffer space **23** from time to time.

What is claimed is:

1. An excavating device for a bucket excavator (**1**) or a bucket shovel loader including a bucket (**3**) supported by a carrier and having a reception chamber (**4**) with an inlet opening (**7**) and a material through-flow opening (**11**), a material shredder (**12**) arranged in the material through-flow opening (**11**) and a classifier (**25**) arranged outside the reception chamber (**4**) and mounted to the bucket (**3**).

2. The excavating device according to claim 1, wherein the material through-flow opening (**11**) is arranged opposite the inlet opening (**7**).

3. The excavating device according to claim 1, wherein the material shredder (**12**) is at least one of a milling cutter rotor (**16**) with chisels mounted thereon and a drum provided with impact strips.

4. The excavating device according to claim 1, wherein the material shredder (**12**) includes a drum provided with a hydraulic drive means.

5. The excavating device according to claim 1, wherein the drive means is operable in opposite directions of rotation.

6. The excavating device according to claim 1, wherein the classifier (**25**) is movably supported on the bucket (**3**).

7. The excavating device according to claim 1, wherein the the classifier (**25**) is removably supported on the bucket (**3**).

8. The excavating device according to claim 1, wherein the classifier (**25**) is mounted on the bucket (**3**) by a rapid connection coupling.

9. The excavating device according to claim 1, wherein the classifier (**25**) is disposed in a classifier housing (**24**) which is fitted, and connectable to the bucket (**3**).

10. The excavating device according to claim 1, wherein the classifier (**25**) is in communication with the material flow-through opening (**11**) of the bucket (**3**).

11. The excavating device according to claim 10, wherein the shredder (**12**) includes a rotor (**16**) and a separation line (**26**) extends between the classifier (**25**) and the bucket (**3**) at such an area that the rotor (**16**) projects at least partially from the bucket (**3**) when the classifier is moved away from the bucket (**3**).

12. The excavating device according to claim 1, wherein the classifier (**25**) is a single stage classifier extending in only one classifying plane.

13. The excavating device according to claim 1, wherein the classifier (**25**) is a multi-stage classifier having several classifier planes (**51**, **52**).

14. The excavating device according to claim 1, wherein the classifier (**25**) is a roller classifier.

15. The excavating device according to claim 1, wherein the classifier (**25**) is in the form of a sieve classifying device.

16. The excavating device according to claim 15, wherein the sieve classifying device is formed by at least one of rods and ropes extending across a material flow passage.

17. The excavating device according to claim 16, wherein means are provided for vibrating the sieve classifying device.

18. The excavating device according to claim 1, wherein the classifier (**25**) has at least one discharge opening (**36**) for discharging coarse material not passing through the classifier and at least one opening (**35**) for discharging hue particles passing through the classifier (**25**).

19. The excavating device according to claim 18, wherein the discharge opening (**36**) for coarse material (**37**) is provided with a gate.

20. An attachment classifier (**25**) including a housing (**24**) with classifying means (**29** to **34**) and a connecting structure (**26**, **27**, **28**) for mounting the classifier (**25**) to an excavating apparatus (**2**).

21. An excavating bucket (**3**) having a wall arrangement (**5**) with an excavation opening (**7**) and a material through-flow opening (**11**) and a classifier (**25**) disposed in a space arranged after the material through-flow opening (**11**) outside the material reception space (**4**) of the bucket (**3**).

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