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(54) **Cutting assembly for food grinding machines**

Schneidvorrichtung für eine Maschine zum Zerkleinern von Nahrungsmitteln

Dispositif de coupe pour machines à hacher les aliments

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Description

[0001] The present invention relates to a cutting assembly for food grinding machines, according to the preamble of claim 1. Such a cutting assembly is known from DE 16 32 132 A.

[0002] Conventional grinding machines used in the alimentary field are essentially constituted by a screw feeder, which is inserted in a specifically provided cylindrical seat arranged downstream of an inlet, is turned by a specifically provided motor and conveys the food towards a plurality of blades which rotate coaxially thereto, are fitted on the same driving shaft as the screw feeder, are grouped in a pack and are alternated with perforated screening diaphragms.

[0003] The diaphragms are arranged in a gradually decreasing sequence as regards both the density of the holes that affect each diaphragm and the diameter of the holes, so as to gradually provide, as the food advances outwards, a progressively finer reduction of the particle size of the mass.

[0004] However, especially in the processing of very dense food or of food having a fleshy pulp, the resistance that occurs when the mass passes between the diaphragms generates a very intense pressure, which is transmitted and distributed to said diaphragms, to the rotating blades and to the screw feeder.

[0005] Accordingly, this entails, especially in the industrial use of grinding machines, the use of motors with a high power rating, even as high as 70 HP, in order to overcome the resistance opposed by the mass being processed.

[0006] As a further consequence, there is provided a gradual deterioration not only of the sharpness of the blades but also of their structure, which by wearing very quickly require their replacement on the average every 4-5 working hours in addition to releasing microscopic fragments into the food.

[0007] Another problem of the known art in this field is the fact that in the diaphragms, the perforations that allow passage through them are distributed on each diaphragm with a decreasing density with respect to their surfaces, and this worsens the problem of the pressure applied by the food mass.

[0008] The principal aim of the present invention is to solve the above problems of the known art by providing an improved cutting assembly for food grinding machines which substantially reduces the pressure produced during processing, eliminates the possibility of releasing structural particles into the food and maintains a constant density of the distribution of the holes as the screening capacity gradually becomes finer.

[0009] This aim, these objects and others are achieved by an improved cutting assembly for food grinding machines, characterized in that it comprises a static outer jacket provided with conventional means for coupling to the loading inlet of a grinding machine, annular recesses being formed in the internal thickness of

said jacket, said recesses having preset volumes and being mutually separated, a food pusher element being mounted inside said jacket so that it rotates coaxially, a screening means with differentiated passage regions being interposed between said pusher and said jacket, each region acting at said annular recesses.

[0010] Further characteristics and advantages will become apparent from the description of a preferred embodiment of a cutting assembly for food grinding machines, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a longitudinal sectional view of the invention according to a first embodiment of the present invention;

figure 2 is a transverse sectional view, taken along the plane II-II of figure 1;

figure 3 is a sectional view of a second embodiment of the present invention;

figure 4 is a transverse sectional view, taken along the plane IV-IV of figure 3.

[0011] With particular reference to the above figures, the reference numeral 1 generally designates the cutting assembly for food grinding machines, which comprises a static outer jacket 2 provided with conventional means 3 for coupling to a loading inlet of a grinding machine, which is not illustrated since it is of a conventional kind.

[0012] A plurality of annular recesses 4 is formed in the internal thickness of the jacket 2; the recesses have preset volumes and are mutually separated.

[0013] A food cutter and pusher element 5 is mounted inside the jacket 2 so as to rotate coaxially and is supported in the grinding machine through conventional means which are adapted to keep it constantly centered; a screening means 6 is interposed between the cutter and pusher element 5 and the jacket 2 and is divided into differentiated passage regions Z_1 , Z_2 , Z_3 and Z_4 , each of which can be crossed at each annular recess 4.

[0014] All of the recesses have a transverse cross-section with rounded edges which are blended with the concurrent ones by means of a respective convex profile 7, so as to define a forced path for the food, on which the screening means 6 rests and is locked.

[0015] The cutter and pusher element 5 is constituted, in detail, by a screw-shaped blade 8, the spiral edge 8a of which is advantageously sharp and rotates so as to skim the internal surface of the screening means 6.

[0016] The screening means is constituted by a thin cylindrical body 9, the surface of which is affected by contiguous bands of sets of through holes 10 which constitute the differentiated passage regions Z_1 , Z_2 , Z_3 , Z_4 in which the ratio between the continuous surface and the perforated surface is constant throughout.

[0017] In a possible alternative embodiment, the static outer jacket 2 can flare outwards, as shown in figure 2; accordingly, the screw-shaped blade 8 also has the

same shape, and so does the interposed cylindrical body 9 that constitutes the screening means 6, which in this case is constituted by the coaxial and sequential joining of a plurality of cylinders 9a, 9b, 9c, 9d whose diameters gradually increase outwards; each cylinder defines one of the regions Z_1, Z_2, Z_3, Z_4 , and the cylinders are mutually joined by means of corresponding perforated collars 11.

[0018] In this case, too, each one of the cylinders 9a, 9b, 9c, 9d has lateral surfaces affected by the corresponding sets of through holes 10 whose diameters decrease for each cylinder, so that the ratio between the perforated surface and the continuous surface is constant for each cylinder.

[0019] In order to better facilitate the advancement of the mass of processed food, the axis A' of the holes 10 is directed towards the outlet.

[0020] The operation of the present invention can be easily deduced from the above description: the food to be ground is introduced normally in the grinding machine through a hopper and passes from there into the seat in which the conventional screw feeder rotates; the cutting assembly 1 is installed coaxially at the head of said screw feeder.

[0021] The food, after the action of said screw feeder, is pushed further by the blade 8, which is also screw-shaped, and the spiral edge 8a of said blade rotates so as to skim the cylindrical body 9 and is kept centered therein with conventional means for supporting it on the machine; at the same time, the food is engaged and cut by said spiral edge 8a, which is conveniently sharp.

[0022] The conveyance motion forces the food to pass through the various regions Z_1, Z_2, Z_3, Z_4 , following the forced path defined between the annular recesses 4 and the grooves 8b which are alternated with the spiral edge 8a, as shown in figure 1 by the arrows "A"; in following this path, the mass of food passes through the holes 10, whose diameters gradually decrease along the path, thus providing a gradually finer shredding action.

[0023] It should also be noted that the number of the holes 10 for each region Z is such as to maintain a constant ratio between the continuous surfaces of the regions Z and the perforated ones, so as to considerably reduce the pressure applied by the mass of food in passing through them.

[0024] Moreover, since the cylindrical body 9 is static, tangential stress, and therefore also abrasion, between the spiral edge 8a of the screw-shaped blade 8 and the cylindrical body 9, in which the regions Z are formed, are also eliminated, and the blade is always centered as it rotates.

[0025] It has thus been shown that the described invention achieves the intended aim and objects.

[0026] The present invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0027] All the details may also be replaced with other technically equivalent elements.

[0028] In the practical embodiment of the present invention, the materials used, as well as the shapes and the dimensions, may be any according to the requirements without thereby abandoning the scope of the protection of the appended claims.

[0029] 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 cutting assembly for food grinding machines, comprising a static outer jacket (2) provided with conventional means for coupling (3) to the loading inlet of a grinding machine, annular recesses (4) being formed in the internal thickness of said jacket (2), said recesses (4) having preset volumes and being mutually separated, a food pusher and cutter element (5) being mounted inside said jacket (2) so that it rotates coaxially, **characterized in that** it comprises a screening means (6) with differentiated passage regions (Z_1 - Z_4), each of which can be crossed at said annular recesses (4), being interposed between said pusher (5) and said jacket (2).
2. A cutting assembly according to claim 1, **characterized in that** said annular recesses (4) have a transverse cross-section with rounded edges which are blended with concurrent edges with a convex profile and are adapted to define a forced path for the food, each convex profile furthermore acting as supporting and locking element for said screening means (6).
3. A cutting assembly according to claim 1, **characterized in that** said cutter and pusher element is constituted by a screw-shaped blade, a sharp spiral edge of which rotates so as to skim an internal surface of said screening means.
4. A cutting assembly according to claim 1, **characterized in that** said screening means (6) is constituted by a thin hollow cylindrical body, the surface of which is affected by contiguous bands of sets of through holes (10), which constitute said differentiated passage regions.
5. A cutting assembly according to claim 4, **characterized in that** the ratio between the surface with said through holes (10) and the remaining portion of surface of said regions is constant for each re-

gion.

6. A cutting assembly according to claim 1, **characterized in that** said static outer jacket (2) flares outwards.

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7. A cutting assembly according to claim 6, **characterized in that** said screening means (6) with differentiated through regions is constituted by a hollow body which is formed by the coaxial and sequential joining of a plurality of cylinders whose diameters increase gradually outwards, each one of said cylinders defining a region, said cylinders being mutually joined by means of corresponding perforated collar (11), each one of said cylinders having corresponding sets of through holes whose diameters decrease for each cylinder.

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8. A cutting assembly according to claim 7, **characterized in that** the ratio between the surface with said through holes (10) and the remaining portion of the surface is constant for each cylinder.

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9. A cutting assembly according to claim 7, **characterized in that** the axis of said holes (10) is oriented along the food advancement direction.

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Patentansprüche

1. Schneidvorrichtung für eine Maschine zum Zerkleinern von Nahrungsmitteln, mit einem statischen Außenmantel (2), der mit herkömmlichen Mitteln (3) zum Ankuppeln an den Fülleinsatz einer Zerkleinerungsmaschine versehen ist, mit ringförmigen Einschnitten, die von innen in das Material des Mantels (2) eingeformt sind, wobei die Einschnitte (4) vorbestimmte Volumina besitzen und voneinander getrennt angeordnet sind, mit einem Nahrungsmittel-Schub- und Schneidelement (5), das innerhalb des Mantels (2) befestigt ist, so dass es koaxial rotiert, **dadurch gekennzeichnet, dass** sie ein Siebmittel (6) mit unterschiedlichen Durchtrittsbereichen (Z_1 - Z_4), von denen jeder die ringförmigen Einschnitte (4) quert, besitzt, wobei das Siebmittel zwischen dem Element (5) und dem Mantel (2) angeordnet ist.

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2. Schneidvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die ringförmigen Einschnitte (4) einen Querschnitt mit gerundeten Kanten aufweist, die mit verzahnt laufenden Kanten mit einem konvexen Profil vermischt und dazu angepasst sind, einen erzwungenen Weg für das Nahrungsmittel zu definieren, wobei jedes konvexe Profil ferner als Halte- und Sperrelement für das Siebmittel (6) wirkt.

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3. Schneidvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Schneid- und Schubelement durch ein schraubenförmiges Messer gebildet ist, von dem eine scharfe Spiralkante so rotiert, dass eine Innenfläche des Siebmittels abgestrichen wird.

4. Schneidvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Siebmittel (6) durch einen dünnen hohlen Zylinderkörper gebildet ist, dessen Oberfläche mit kontinuierlichen Bändern von Sätzen von Durchgangsbohrungen (10) durchdrungen ist, die die verschiedenen Durchtrittsbereiche bilden.

5. Schneidvorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** das Verhältnis zwischen der Fläche mit den Durchgangsbohrungen (10) und dem verbleibenden Bereich der Fläche dieser Bereiche für jeden Bereich konstant ist.

6. Schneidvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der statische Außenmantel (2) sich nach außen konisch erweitert.

7. Schneidvorrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** das Siebmittel (6) mit unterschiedlichen Durchtrittsbereichen durch einen Hohlkörper gebildet ist, der durch das koaxiale und aufeinanderfolgende Verbinden einer Vielzahl von Zylinder gebildet ist, deren Durchmesser sich stufenweise nach außen vergrößert, von denen jeder Zylinder einen Bereich definiert, wobei die Zylinder mit Hilfe entsprechender perforierter Kragen (11) miteinander verbunden sind, und wobei jeder der Zylinder entsprechende Sätze von Durchgangsbohrungen besitzt, deren Durchmesser für jeden Zylinder abnehmen.

8. Schneidvorrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass** das Verhältnis zwischen der Fläche mit den Durchtrittsbohrungen (10) und dem verbleibenden Bereich der Fläche für jeden Zylinder konstant ist.

9. Schneidvorrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass** die Achse der Bohrungen (10) längs der Nahrungsmittelvortriebsrichtung gerichtet ist.

Revendications

1. Dispositif de coupe pour machines à hacher les aliments, comprenant une chemise extérieure statique (2) munie de moyens d'accouplements conventionnels (3) à un orifice d'entrée d'une machine à hacher, des cavités annulaires (4) étant formé dans

l'épaisseur interne de ladite chemise (2), lesdites cavités (4) étant de volumes prédéfinis et séparées entre elles, un poussoir à aliments et un élément coupant (5) sont montés dans ladite chemise (2) de telle façon qu'ils tournent de manière coaxiale, **caractérisé en ce que** des moyens de criblage (6) qui ont des régions de passage différenciées (Z1 à Z4), chacune d'entre elles pouvant être traversée au niveau desdites cavités annulaires (4), qui sont interposées entre lesdits poussoirs (5) et ladite chemise (2).

2. Ensemble de coupe selon la revendication 1, **caractérisé en ce que** lesdites cavités annulaires (4) ont une section transversale aux arêtes arrondies fusionnées avec les arêtes adjacentes selon un profil convexe et qui sont adaptées pour définir un chemin forcé pour les aliments, chaque profil convexe agissant en outre comme un élément de support et de verrouillage pour lesdits moyens de criblage (6).

3. Ensemble de coupe selon la revendication 1, **caractérisé en ce que** ledit élément coupant et poussoir est constitué d'une lame en forme de vis, une arête spirale tranchante qui tourne de telle façon qu'elle effleure une surface interne dudit moyen de criblage.

4. Ensemble de coupe selon la revendication 1, **caractérisé en ce que** ledit moyen de criblage (6) est constitué d'un corps cylindrique creux et fin, dont la surface est modifiée par des jeux de bandes continues de trous de passage (10), qui constituent lesdites régions de passage différenciées.

5. Ensemble de coupe selon la revendication 4, **caractérisé en ce que** le rapport entre la surface contenant lesdits trous de passage (10) et la partie restante de la surface desdites régions est constant pour chaque région.

6. Ensemble de coupe selon la revendication 1, **caractérisé en ce que** ladite chemise extérieure statique (2) s'évase vers l'extérieur.

7. Ensemble de coupe selon la revendication 6, **caractérisé en ce que** ledit moyen de criblage (6) muni de régions de passage différenciées est constitué d'un corps creux formé par la réunion coaxiale et séquentielle d'une pluralité de cylindres dont les diamètres s'accroissent progressivement vers l'extérieur, chacun desdits cylindres définissant une région, lesdits cylindres étant reliés mutuellement au moyen d'un collier perforé correspondant (11), chacun desdits cylindres ayant des jeux correspondants de trous de passage dont les diamètres diminuent pour chaque cylindre.

8. Ensemble de coupe selon la revendication 7, **caractérisé en ce que** le rapport entre la surface qui a les dits trous de passage (10) et la partie restante de la surface est constant pour chaque cylindre.

9. Ensemble de coupe selon la revendication 7, **caractérisé en ce que** l'axe desdits trous (10) est orienté dans le sens d'avancement des aliments.

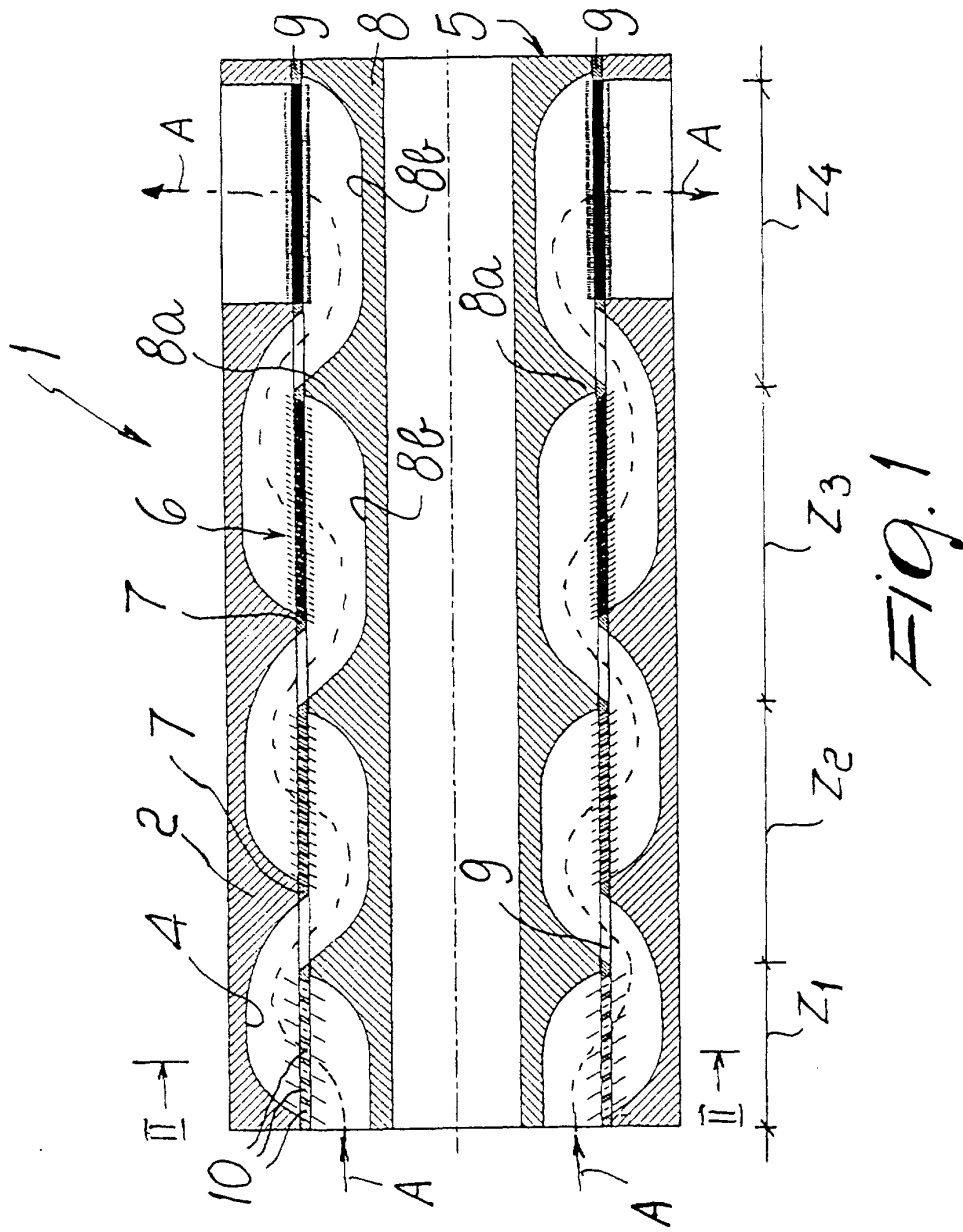


Fig. 1

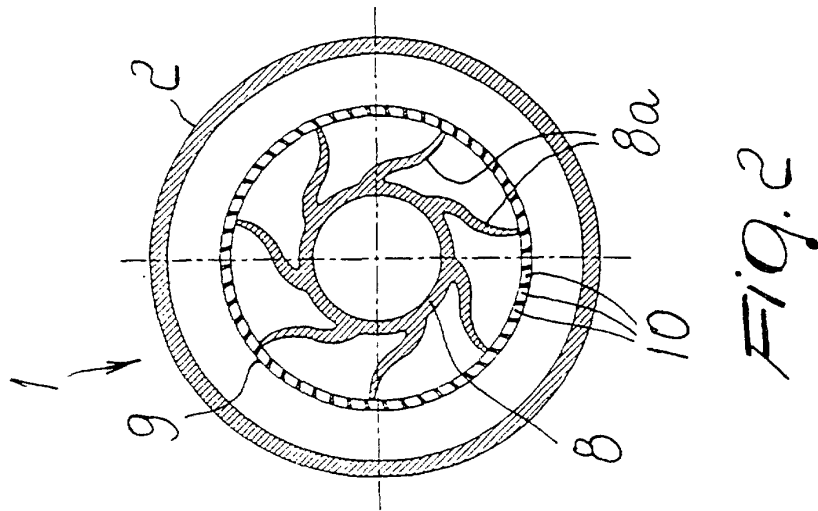


Fig. 2

FIG. 3

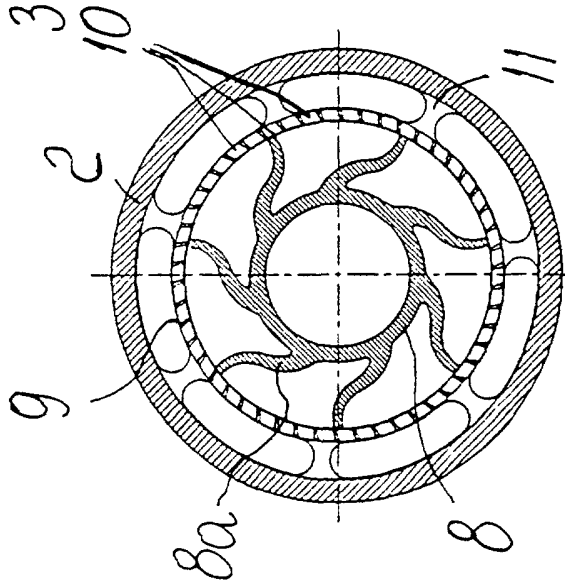
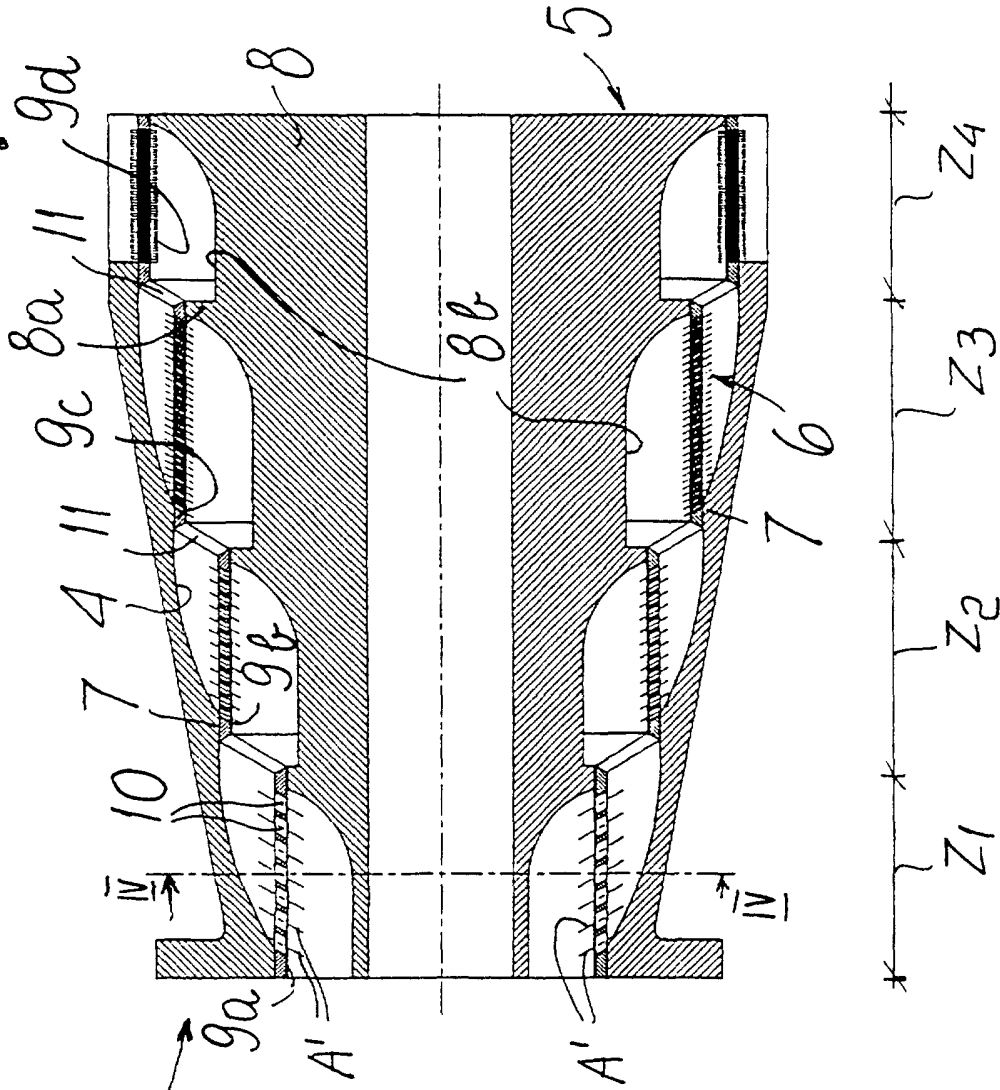


FIG. 4