United States Patent

[11] 3,613,755

[72] Inventor **Friedrich Otto**
Hameln, Germany

[21] Appl. No. **716,722**
[22] Filed **Mar. 28, 1968**
[45] Patented **Oct. 19, 1971**

[73] Assignee **Belder Trust, Reg.**
Vaduz, Liechtenstein

[32] Priority **Nov. 29, 1967**
[33] **Germany**
[31] **St 27615**

[54] **APPARATUS FOR FINELY COMMINUTING MEAT OR THE LIKE**
3 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **146/192,** 146/183
[51] **Int. Cl.** **B02c 18/06**
[50] **Field of Search** 146/192, 183, 78, 162, 163, 124, 182

[56] **References Cited**

UNITED STATES PATENTS

3,219,081	11/1965	Brundler	146/192 X
3,399,704	9/1968	Otto	146/192 X

FOREIGN PATENTS

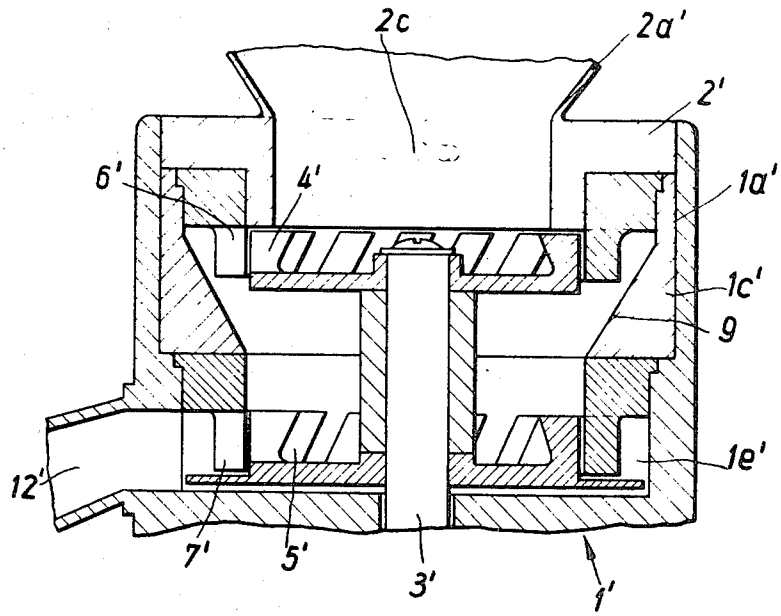
1,045,508	10/1966	Great Britain	146/192
1,009,845	6/1957	Germany	146/192
924,862	5/1963	Great Britain	146/192

OTHER REFERENCES

Stephan Fine Meat Cutting Machine brochure in 146/192 Received 2/4/1965

Primary Examiner—Andrew R. Juhasz
Assistant Examiner—Z. R. Bilinsky
Attorney—Michael S. Striker

ABSTRACT: Apparatus for comminuting meat comprises a housing in which is journaled a motor-driven shaft supporting two axially spaced rings of rotary teeth each cooperating with and surrounded by a ring of stationary teeth to comminute meat which is admitted first into the range of one ring of rotary teeth to undergo a coarse comminuting action during passage between the rotary teeth and the teeth of the corresponding stationary ring. A cylindrical or conical internal surface of the housing guides coarsely comminuted meat into the range of the other rotary ring so that the material undergoes a fine comminuting action during passage between the teeth of the other rotary ring and the teeth of the associated stationary ring.



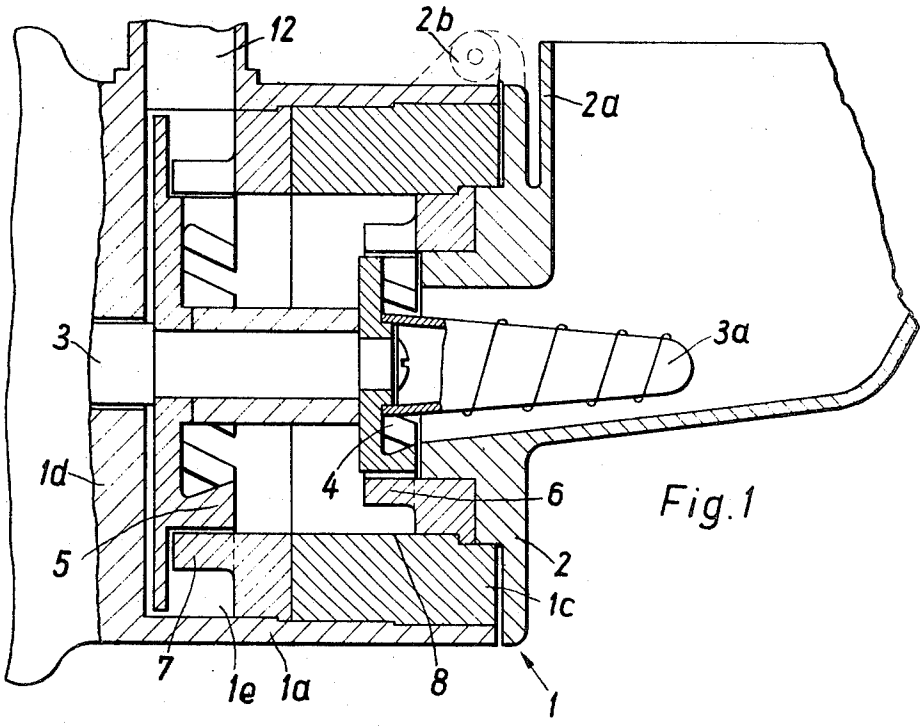


Fig. 1

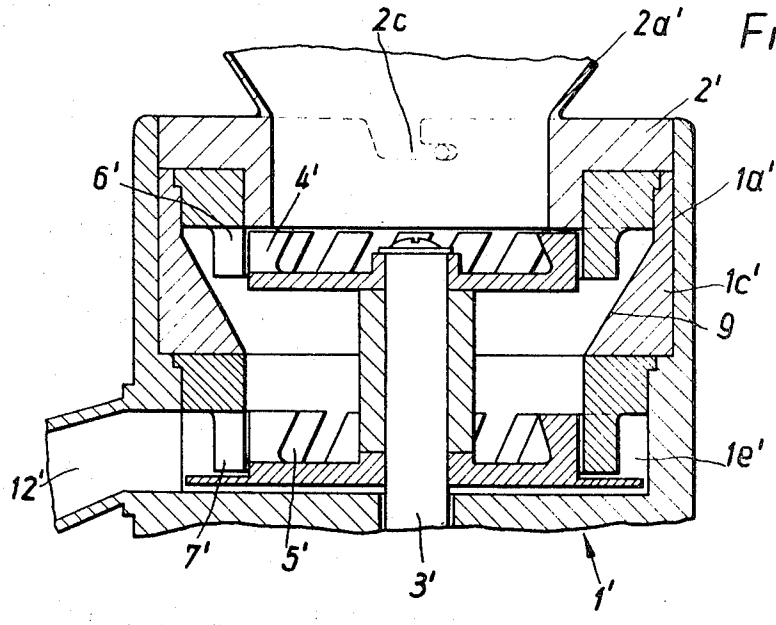


Fig. 2

Inventor:
Friedrich Otto
by Michael S. Striker
his attorney

Fig. 3

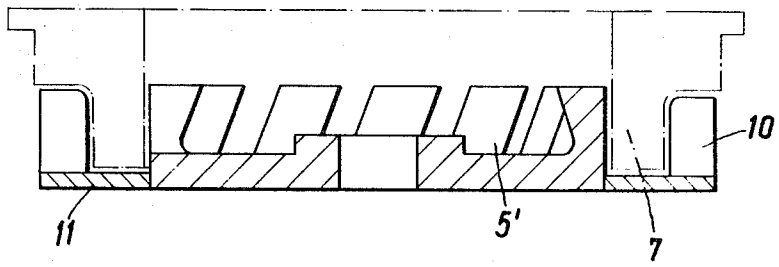
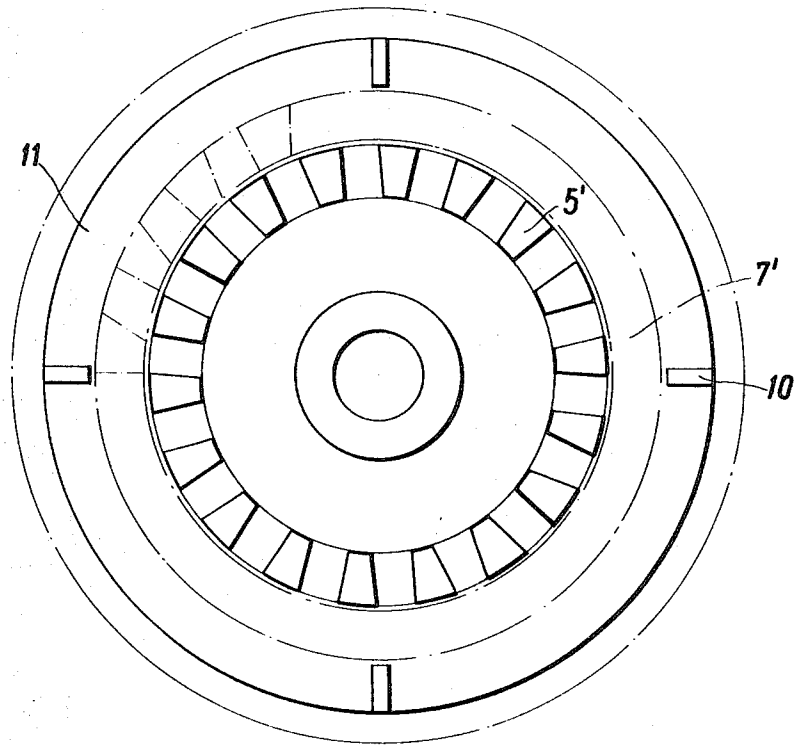


Fig. 4



Inventor:
Friedrich Otto
by Michael S. Striker
his attorney

APPARATUS FOR FINELY COMMINUTING MEAT OR THE LIKE

BACKGROUND OF THE INVENTION

The present invention relates to apparatus for comminuting meat or like mincible materials. More particularly, the invention relates to improvements in apparatus for comminuting mincible materials by causing such materials to enter the range of a ring of rotary teeth which are surrounded by a ring of complementary teeth so that the material is comminuted during passage between the two rings of teeth.

Apparatus of the just outlined character have found widespread acceptance in industrial meat-processing establishments as well as in households. However, it happens from time to time that meat or like mincible materials must be subjected to a very fine comminuting action. If the apparatus is designed to furnish an average comminuting action, the material must be passed through the apparatus more than once. Alternatively, it is necessary to purchase two or more apparatus each of which furnishes a certain (coarse, medium or fine) comminuting action. Such solutions are not entirely satisfactory because, if the material is passed through one and the same apparatus twice or more than twice, it takes much time to obtain a product of desired particle size. If the material is passed through two or more different apparatus, or if the user keeps in stock two or more apparatus, the initial and maintenance costs are relatively high and several apparatus occupy too much room, not only in storage but also when put to use.

SUMMARY OF THE INVENTION

It is an object of my invention to provide an apparatus which can be utilized for finely comminuting meat or like mincible materials in a single operation and which occupies little room and comprises a relatively small number of parts.

Another object of the invention is to provide a multistage apparatus which can subject meat or the like to a fine comminuting action without affecting the quality of such materials and by consuming less energy than necessary to obtain a product of equal particle size by resorting to conventional procedures.

A further object of the invention is to provide an apparatus which can subject meat or like materials to a series of rapidly following comminuting actions and wherein a single prime mover suffices to drive the moving parts which bring about such series of comminuting actions.

An additional object of the invention is to provide a novel housing for use in an apparatus of the just outlined character.

Still another object of the invention is to provide a comminuting apparatus which can process meat or like materials without causing discoloration or other adverse effects in the course of conversion of intermittently or continuously supplied pieces of meat or the like into finely comminuted particulate material.

The improved apparatus comprises a housing having an inlet, rotary drive means which preferably comprises a single motor-driven shaft rotatably journaled in the housing, and a plurality of spaced cutting devices provided in the housing and including first and second cutting devices respectively located nearer to and further away from the inlet. Each cutting device comprises a first set of teeth affixed to the shaft and a second set of teeth adjacent to the respective first set. The inlet admits material into the range of teeth in the first cutting device whereby such material undergoes a coarse comminuting action and passes between the rotary and second teeth of the first cutting device. The housing comprises guide means for directing coarsely comminuted material into the range of teeth in the second cutting device wherein such material undergoes a fine comminuting action and is caused to pass between the rotary and second teeth of the second cutting device to be evacuated through an outlet of the housing.

The guide means may comprise a cylindrical internal surface in the housing or a conical internal surface which tapers

in a direction toward the second cutting device, particularly if the dimensions of the second cutting device at most equal or are smaller than those of the first cutting device. The teeth in each cutting device preferably form two annuli and the second set preferably surrounds the rotary teeth.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved comminuting apparatus itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary partly elevational and partly central vertical sectional view of a horizontal comminuting apparatus which embodies my invention;

FIG. 2 is a fragmentary central vertical sectional view of an upright comminuting apparatus;

FIG. 3 is a Xlarger-scale axial sectional view of the second cutting device in the apparatus of FIG. 2; and

FIG. 4 is a top plan view of the structure shown in FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a horizontal comminuting apparatus which comprises a housing 1 including a main body portion 1*a*, an inlet 2*a* having a flange 2 which is pivotally connected to the main body portion 1*a* by a horizontal hinge 2*b*, and a spacer sleeve 1*c* which is received in the main body portion and abuts against the flange 2. The drive means of this apparatus comprises a motor having a horizontal drive shaft 3 which is journaled in a wall 1*d* of the main body portion 1*a* and carries two axially spaced annuli or sets of teeth 4 and 5. The teeth 4 are nearer to the inlet 2*a* and are provided on a disk which is affixed to the shaft 3. These teeth are surrounded by a second annulus or set of teeth 6 which are rigid with a ring installed in the housing 1 between the flange 2 and an internal shoulder of the sleeve 1*c*. The teeth 4 and 6 together form a first or coarse cutting device which brings about an initial or coarse comminuting action upon meat or other mincible material which is being admitted into the area surrounded by teeth 4 by way of the inlet 2*a*. The drive shaft 3 carries a feed screw 3*a* which extends into the lower portion of the inlet 2*a* and conveys meat into the range of teeth 4 and 6.

The teeth 5 are rigid with a disk which is affixed to the shaft 3. These teeth cooperate with an annulus or set of teeth 7 which are rigid with a ring installed in the housing 1 between the sleeve 1*c* and an internal shoulder of the main body portion 1*a*. The teeth 5 and 7 together form a second or fine cutting device which brings about a final or fine comminuting action and causes finely comminuted meat to pass radially outwardly into an annular chamber 1*e* of the housing 1. The chamber 1*e* surrounds the teeth 7 and communicates with an outlet 12 which discharges finely comminuted material. The sleeve 1*c* has a circumferentially complete cylindrical internal surface 8 which serves as a means for guiding coarsely comminuted meat from the area surrounding the teeth 6 into the range of teeth 5. The diameter of the second cutting device including the teeth 5, 7 exceeds the diameter of the first cutting device which has teeth 4 and 6. The operation is as follows:

The motor which drives the shaft 3 is started so that the teeth 4 and 5 rotate with the shaft and the shaft also rotates the feed screw 3*a*. Material which is admitted by way of the inlet 2*a* is conveyed into the range of teeth 4 and such teeth comminute the material in cooperation with stationary teeth 6 to form a mass of coarsely comminuted particles which pass through the gaps between the teeth 4, 6 and into the annular space surrounding the teeth 6. The guide surface 8 directs such coarsely comminuted material toward and into the range of teeth 5 in the second cutting device. The material is subjected to a fine comminuting action during passage through

the gaps between the teeth 5, 7 and is compelled to enter the chamber 1e to be evacuated by way of the outlet 12. If desired, the shaft 3 may drive one or more material-transporting vanes which rotate in the chamber 1e to advance finely comminuted material toward and into the outlet 12 without any appreciable delay. Such vanes will be described in connection with FIGS. 2 to 4. The guide surface 8 serves as a means for suddenly changing the direction of material advance from a direction radially outwardly (i.e., radially beyond the outer teeth 6) to a direction which is parallel with the axis of the shaft 3.

FIG. 2 shows an upright comminuting apparatus wherein the parts are denoted by numerals similar to those employed in FIG. 1. The housing 1' comprises a main body portion 1a', an inlet 2a' having a flange 2' which extends into the upper part of the main body portion, a sleeve 1c' which is received in the main body portion below the flange 2', a bayonet connection 2c which connects the flange 2' to the main body portion 1a', an annular chamber 1e', and an outlet 12'. The sleeve 1c' has a conical internal guide surface 9 which tapers in a direction away from the inlet 2a'.

The first cutting device comprises an annulus of teeth 4' affixed to the drive shaft 3' and a second annulus of teeth 6' surrounding the teeth 4' and installed in the housing 1' between the flange 2' and an internal annular shoulder of the sleeve 1c'. The second cutting device comprises an annulus of teeth 5' which are affixed to the drive shaft 3' and an annulus of teeth 7' which surround the teeth 5' and are installed in the main body portion 1a' below the sleeve 1c'. The motor which drives the shaft 3' can be installed in the lower part of the main body portion 1a'. The diameter of the second cutting device equals but can be smaller than that of the first cutting device.

As shown in FIGS. 3 and 4, the drive shaft may carry one or more material-transporting vanes or like members 10 which extend into the chamber 1e' and serve to continuously advance finely comminuted material toward and into the outlet 12'. Such vane or vanes 10 may be provided on a ring-shaped extension 11 of the disk which carries the teeth 5' of the second cutting device. The vane or vanes 10 prevent streaks of discoloration in finely comminuted material by insuring that the material cannot dwell in the chamber 1e' for extended periods of time. Such vanes are described and claimed in my copending application, Ser. No. 716,846 filed Mar. 28, 1968 and entitled "Apparatus for comminuting meat or the like." The extension 11 may but need not be integral with the disk which carries the rotary teeth 5' of the second cutting device.

It is clear that the apparatus of FIG. 2 may also comprise a feed screw to convey material into the range of teeth 4' in the first cutting device. In the absence of such feed screw, the material is caused to advance by gravity or it may be pushed downwardly by a weight which can be placed on top of material in the inlet 2a'. The conical guide surface 9 brings about a sudden deflection of coarsely comminuted material from a radially outward movement (beyond the teeth 6') to a movement in substantial parallelism with the axis of the shaft 3'.

An important advantage of my apparatus is that the rotary teeth of both cutting devices can receive motion from a single drive shaft 3 or 3'. Furthermore, the apparatus can bring about a highly satisfactory fine comminuting action in a series of successive stages which is desirable in order to avoid excessive wear on teeth of the cutting devices. The invention is based on the recognition that, contrary to popular belief, it is possible to rapidly and suddenly deflect coarsely comminuted material into the range of one or more additional cutting devices without adversely affecting the quality of the ultimate product.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of my contribution to the art.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

1. Apparatus for comminuting meat or like mincible materials, comprising a housing having inlet means; rotary drive means; a journal in said housing extending in axial direction thereof; a first cutting device arranged in said housing and including a member having a first rotatable annulus of cutting teeth arranged coaxially with and secured to said drive means rotatable together with the same; a first stationary annulus of cutting teeth arranged surrounding said member having said first rotatable annulus of cutting teeth and secured to said housing so that said first rotatable and stationary annuli of cutting teeth cooperate with each other, said cutting teeth of said first stationary annulus having free ends projecting in axial direction and being spaced from one another so as to form gaps which are open radially as well as in direction axially away from said inlet means; a second rotatable annulus of cutting teeth arranged coaxially with said rotary drive means and spaced from said first rotatable annulus of cutting teeth in a direction away from said inlet means; a second stationary annulus of cutting teeth surrounding said second rotatable annulus of cutting teeth and being secured to said housing; and guide means surrounding the space between said first annuli of cutting teeth and said second annuli of cutting teeth so as to guide comminuted meat or like mincible material comminuted by said first annuli of cutting teeth and leaving the gaps between the teeth of said first stationary annulus of cutting teeth in substantially axial direction thereof, in the direction towards said second rotatable annulus of cutting teeth.

2. Apparatus for comminuting meat or like mincible materials as claimed in claim 1, wherein the cutting teeth of said first rotatable annulus of cutting teeth are spaced from each other forming gaps therebetween and have free ends facing said inlet means so that meat fed through said inlet means may enter the gaps between said cutting teeth of said first rotatable annulus of cutting teeth in axial direction.

3. Apparatus for comminuting meat or like mincible materials as claimed in claim 1, wherein said teeth of said second rotatable annulus of cutting teeth are spaced from each other forming gaps therebetween and have free ends XXXXso that meat or like material comminuted by said first annuli of cutting teeth may be guided in substantially axial direction towards and into the gaps formed between said cutting teeth of said second rotatable annulus of cutting teeth.