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Righele et al.

[11] **3,922,755**

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[54] **ROTARY PUMP FOR FEEDING A CONTINUOUS SAUSAGE-MAKING MACHINE**

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[52] **U.S. Cl.** **17/33**

[51] **Int. Cl.²** **A22C 11/00**

[58] **Field of Search** 17/33, 35, 37; 53/177; 141/313

[56] **References Cited**

UNITED STATES PATENTS

2,021,831	11/1935	Brightbill	17/35
2,681,279	6/1954	Sloan et al.	17/35
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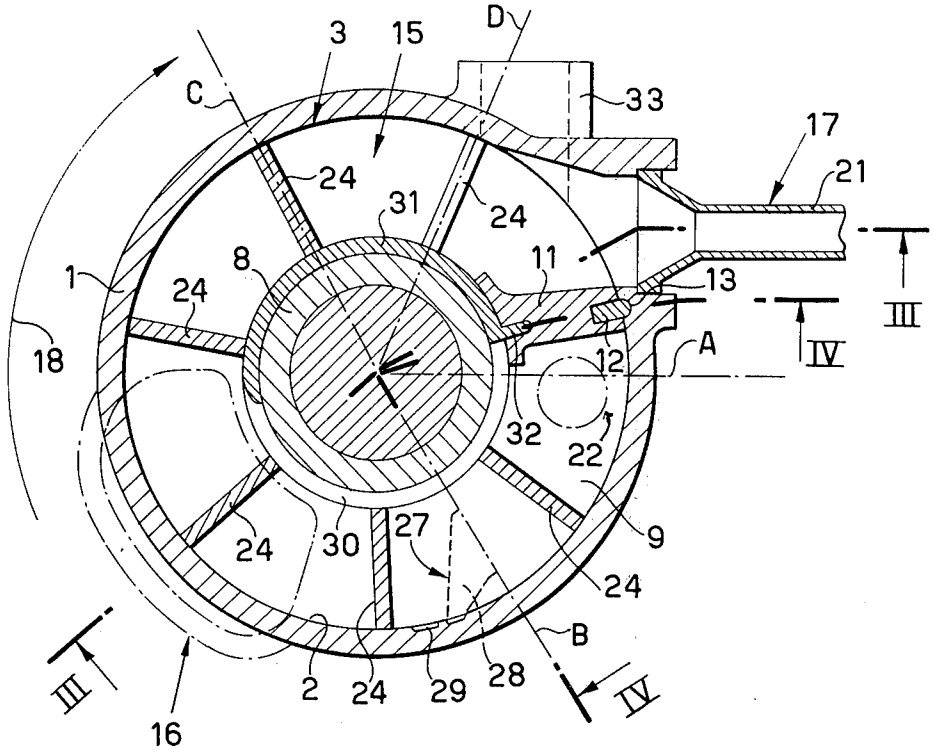
Primary Examiner—G. E. McNeill

Attorney, Agent, or Firm—Cushman, Darby & Cushman

[57] **ABSTRACT**

A rotary pump for a sausage-stuffing machine, of the kind having a rotor from which movable paddles can emerge and slide along the rotor axis, is diclosed, the improvements consisting in that the cam which controls the movement of the paddles has a width equal to that of the bottom portion of the rotor. In addition, provisions are made for recovering the meat which possibly seeped into the lower annular chamber. A further improvement provides for a cam which has a shape complementary to that of the paddle-controlling cam mentioned above, in order that the cooperation between the complementary cam improves the accuracy of the control of the paddles. Other improvements are also indicated, in order to provide a fully reliable machine.

6 Claims, 6 Drawing Figures



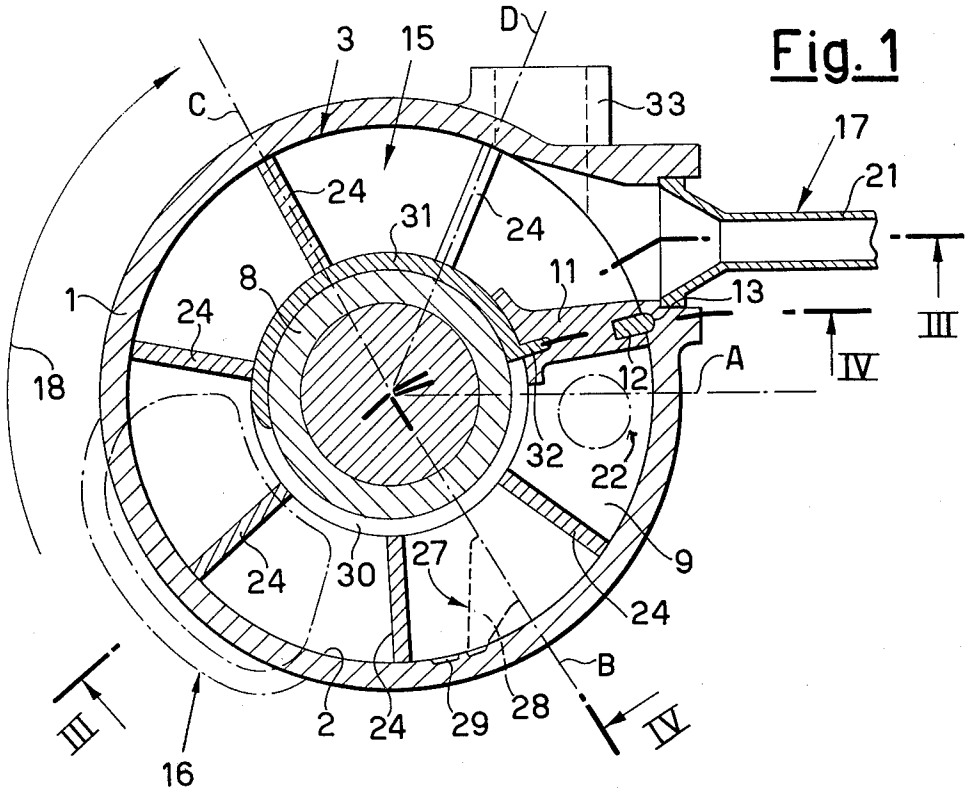

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Fig. 1

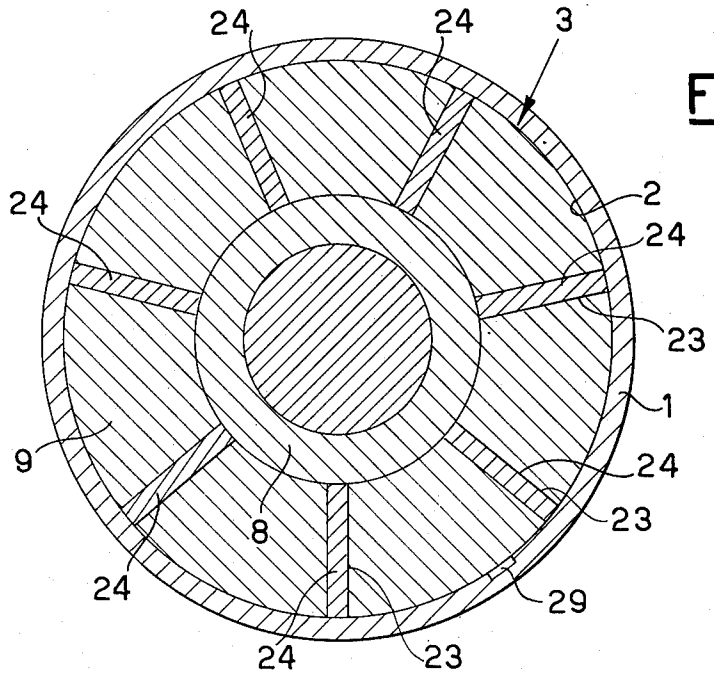
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Fig. 2

Fig. 3

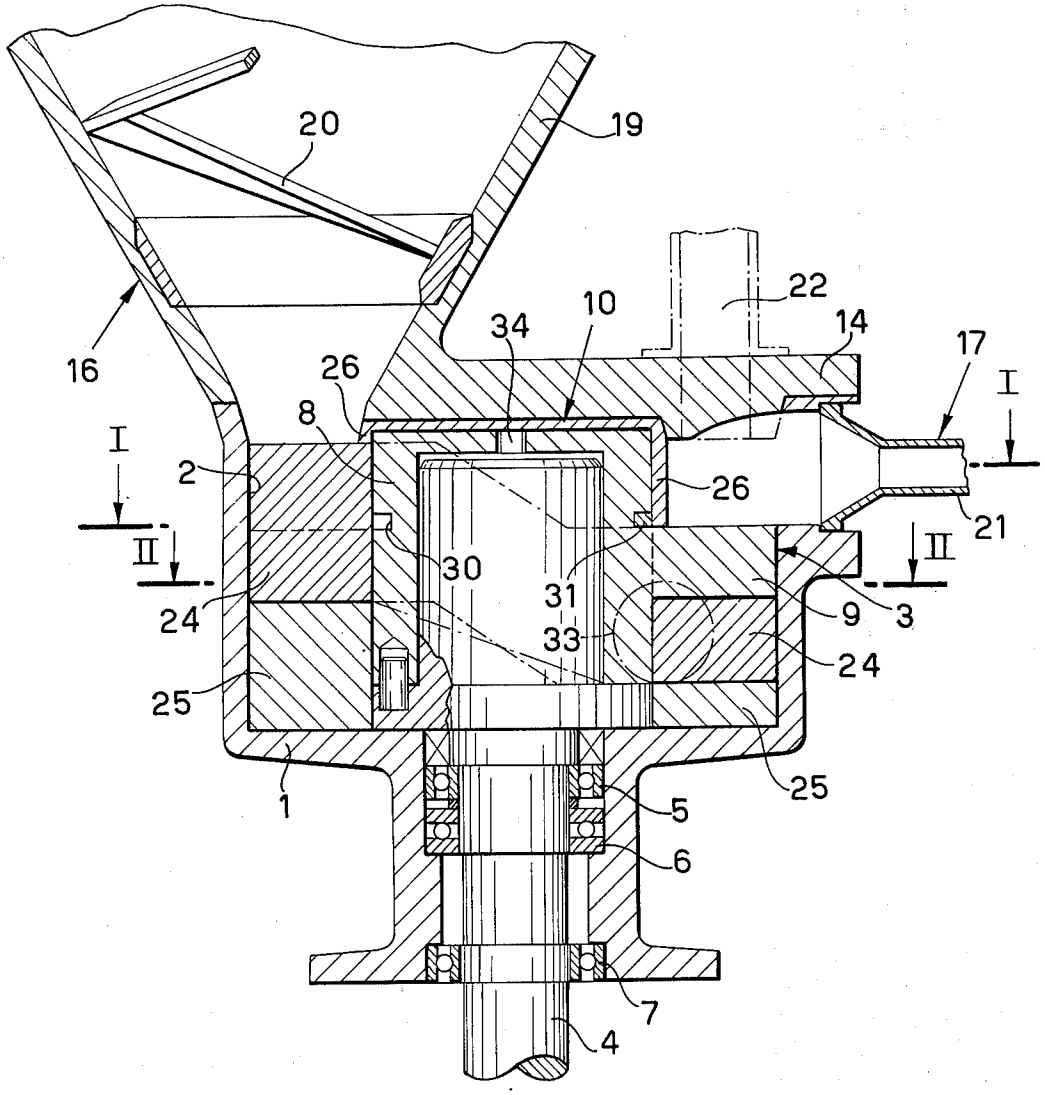
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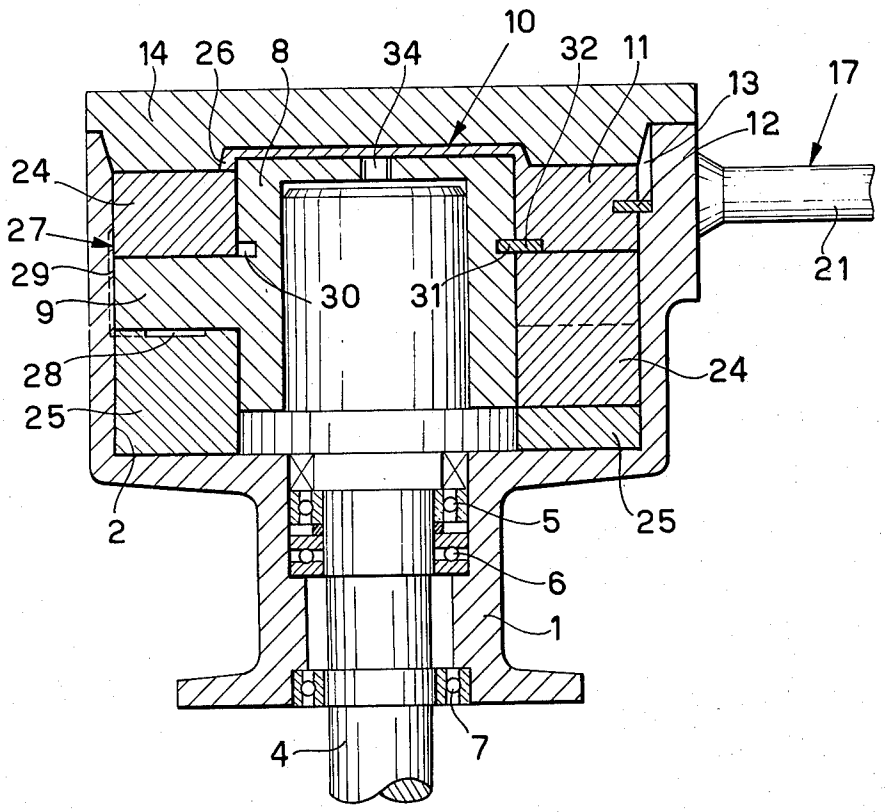
Fig. 4



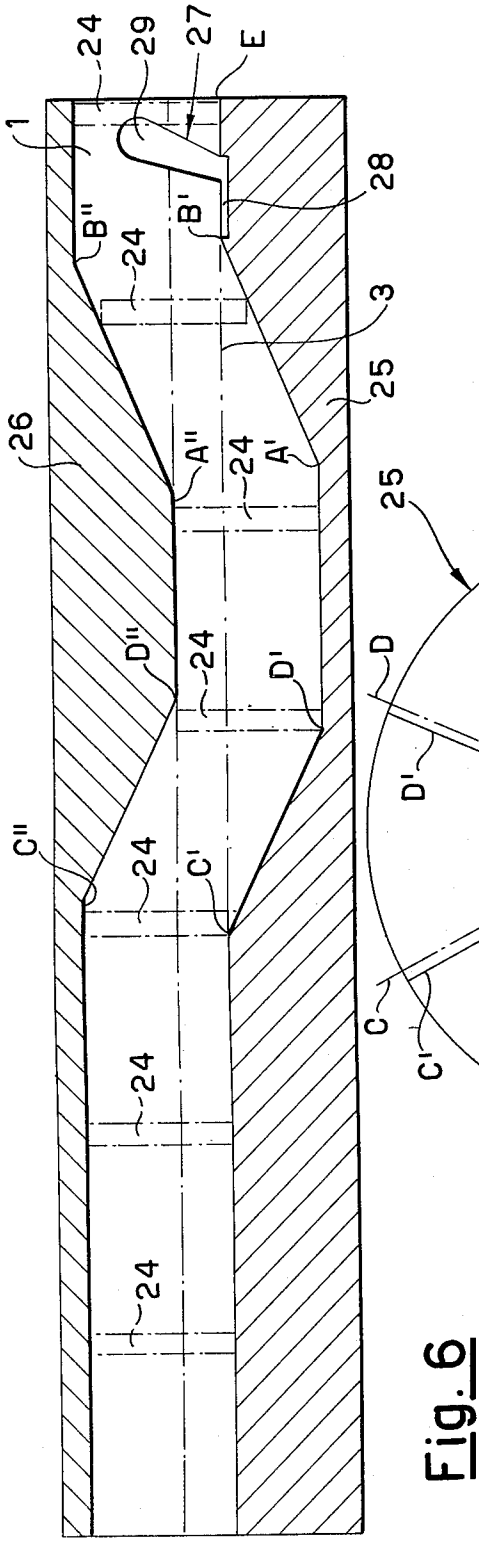


Fig. 6

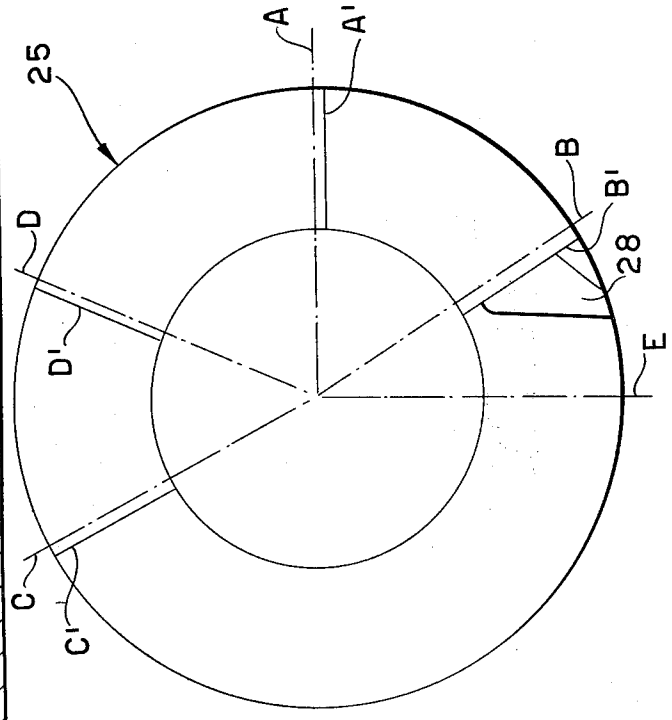


Fig. 5

ROTARY PUMP FOR FEEDING A CONTINUOUS SAUSAGE-MAKING MACHINE

This invention relates to a few improvements introduced in a rotary pump for feeding a continuous sausage-making machine of the kind disclosed and claimed in the Italian patent No. 918,876.

The pump disclosed in the said Italian patent essentially comprises a stator having a cylindrical cavity and a rotor which is rotatable about its own axis, the rotor being coaxially mounted in the stator cavity and is formed by a central cylindrical portion which rises up to a closure lid for the stator cavity and by a peripheral lowered portion, so that between the cylindrical stator wall, the lid and the rotor, an annular chamber is defined, where the minced meat is caused to be fed forward from an entry mouth to a delivery mouth which is appropriately arranged and shaped so that the ultimate section of the travelling path of the meat towards the delivery mouth is substantially straight. To convey the meat from the entry mouth to the delivery mouth there are provided a few movable paddles, which are slidably housed in as many radial hollow spaces of the peripheral portion of the rotor and are driven to slide along the rotor axis according to a preselected programme which provides for having the paddles emerging from the contour of the peripheral portion of the rotor and up to the closing lid of the stator cavity in an area which is downstream of the delivery mouth and upstream of the entry mouth in the direction of rotation of the rotor, and for having the paddles thoroughly entering within the contour of the peripheral portion of the rotor in an area downstream of the entry mouth and upstream of the delivery mouth. Such a preselected programme is defined by an annular cam which is appropriately shaped and is arranged in a fixed position beneath the peripheral portion of the rotor and on which the paddles rest with the intermediary of rollers as mounted on the bottom ends of the paddles. Other essential parts of the pump as disclosed in the main patent, lastly, are constituted by a partition diaphragm for the annular chamber, which is arranged immediately downstream of the delivery mouth and integrally with the stator, and by a vacuum nipple whose task is to withdraw air from the chopped meat.

An object of the present invention is to introduce in the pump according to the above mentioned patent a few improvements such as to improve the operability of the machine and to facilitate its cleaning.

A first improvement according to the present invention is the fact that the annular cam on which the rotor paddles rest has a width equal to that of the peripheral portion of the rotor, the latter portion having such a thickness as to become tangent to the cam at the point of maximum elevation thereof, so that between the cam, the rotor and the stator, a bottom annular chamber is defined, wherein the paddles which jut thereinto from the peripheral rotor portion impart a pumping action which, with the aid of a tiny channel extended partially transversally of the cam along the top surface thereof and partly along the inner cylindrical wall of the stator, causes the meat possibly infiltrated into the lower annular chamber through the interstices between the paddles and the relative housing seats to rise to the top annular chamber again. By so doing the twofold result is obtained of recovering the infiltrated meat while

minimizing the degree of soiling of the space beneath the rotor.

A second improvement according to the invention is the fact that the rising and falling motion of the rotor paddles is governed not only by the lower cam mentioned above, but also by a fixed top cam which has been complementarily shaped. This top cam is preferably integral with a hood placed on the central portion of the rotor and angularly locked with respect to the stator. To the hood is also integrally affixed the partition diaphragm of the annular chamber, which diaphragm is arranged immediately downstream of the delivery mouth. It is obvious that the presence of the top cam permits to accompany the paddles in their rising motion and to control, on the other hand, in a fully reliable manner their descent.

A third improvement according to the present invention is the fact that immediately above the top end of the peripheral portion, the central portion of the rotor is preferably equipped with a circular groove which houses for sliding a fixed half-ring which is so positioned as to occupy one half of the circular groove lying between the filling mouth and the delivery mouth of the annular chamber of the pump. As a result, one half of the groove is always free and is intended to draw towards an appropriate vacuum tap the air entrapped in the meat and the half groove is always kept clean by the continuous sliding of the half ring along the entire groove. In addition to keeping the groove clean, the half ring also fulfils the task of preventing a possible feedback of minced meat from the delivery mouth (high pressure area) to the filling mouth (low pressure area), which could take place should the circular groove be free also in the area from the filling mouth to the delivery mouth. The groove could be dispensed with in the pumps intended for soft meats to avoid that also meat is drawn in together with the air.

A fourth improvement according to the invention is the fact that the vacuum tap for drawing air from the annular chamber of the pump is placed on the stator lid, so that the suction is considerably improved and made more complete.

Lastly, a fourth improvement is the possibility of quickly dismembering the machine component parts for occasional washing.

The foregoing and other features of the present invention, along with the advantages stemming therefrom, will become apparent from the ensuing description of a practical embodiment of the pump according to the invention.

In such a detailed description, reference will be hand, by way of example only, to the accompanying drawings, wherein: had,

FIG. 1 shows a horizontal cross-sectional view, taken along the line I—I of FIG. 3, of a pump according to the invention.

FIG. 2 shows another horizontal cross-sectional view, taken along the line II—II of FIG. 3, of said pump.

FIG. 3 shows a vertical cross-sectional view, taken along the line III—III of FIG. 1, of said pump.

FIG. 4 shows another vertical cross-sectional view, taken along the line IV—IV of FIG. 3, of the above mentioned pump.

FIG. 5 shows a plan view of the bottom cam included in the pump of FIGS. 1 to 4, and

FIG. 6 shows the development on a vertical plane of the two cams which govern the ascent and descent

movements of the rotor paddles contained in the pump of FIGS. 1 to 4.

The pump shown in the drawings comprises a stator 1 having a cylindrical space 2, in whose interior there is coaxially arranged a rotor 3 which can rotate about its axis under the drive of a motive shaft 4 borne by the stator 1 by the agency of three bearings 5, 6 and 7. The rotor 3 is composed by a central cylindrical portion 8 and a peripheral annular depressed portion 9. On the central portion 8 there is slipped a hood 10 which is fitted with a radial extension 11 angularly connected to the stator 1 by the engagement of a dowel 12 integral with the extension 11 in a vertical groove 13 of the internal wall of the stator. (FIGS. 1 and 4).

As can be seen in FIG. 4, the radial extension 11 has its lower end in frictional contact with the upper end of the peripheral portion of the rotor 3. The bottom end of the radial extension aforesaid such as in general the top end of the hood 10, conversely, is in snug fit relationship with the bottom face of a lid 14 which closes the stator chamber 2 (FIGS. 3 and 4). Between the stator 1, the rotor 3, and the lid 14, an annular chamber 15 is thus defined, which is equipped with a filling mouth 16, a delivery mouth 17 and a partition diaphragm (the radial extension 11) which is arranged immediately downstream of the delivery mouth 17 in the direction of rotation of the rotor 3 (arrow 18 in FIG. 1). The filling mouth 16 is a bore formed through the lid 14, and, in registry with same, a feed hopper 19 is provided, having a spiral stirrer 20. The delivery mouth 17, in its turn, is a lateral bore of the stator, and, in registry with it, there is arranged a nozzle having a funnel-shaped inlet 21 onto which the tube, to be stuffed with the minced meat delivered by the pump, is slipped. The annular chamber 15, moreover, is equipped with an air-sucking mouth 22 formed through the lid 14 and intended to be connected to a vacuum extractor for the purpose to be specified hereinafter.

In the peripheral portion 9 of the rotor there are arranged seven radial and equally spaced apart openings 23, which slidably house as many paddles 24; the latter are driven to slide along the rotor axle according to a preselected programme which provides for the gradual projection of the pakkles from the contour of the peripheral portion 9 of the rotor and to the lid 14 (left-hand paddle as viewed in FIGS. 3 and 4) in a space A-B placed downstream of the partition diaphragm 11 and upstream of the filling mouth 16 in the direction of rotation of the rotor (FIG. 1) and the gradual withdrawal within the contour of the peripheral portion of the rotor (right-hand paddle in FIGS. 3 and 4) in an area C-D placed downstream of the filling mouth 16 and upstream of the delivery mouth 17 in the direction of rotation of the rotor (FIG. 1).

Such a preselected programme is defined by the engagement existing between the top and bottom ends of the paddles 24 and two complementarily shaped annular cams 25 and 26 the former being the bottom cam, the latter being the top cam. As can be seen in FIGS. 5 and 6, which show the cam in plan view and developed on a vertical plane, respectively, the bottom cam 25 comprises an ascending portion A'-B', a lifted planar portion B'-E'-C', a descending portion C'-D', and a planar depressed portion D'-A'. As can be seen in FIG. 5, the positions of the points of shape variation A', B', C' and D' coincide with the positions as indicated by the reference letters A, B, C and D, with the exception of a small shift equal to one half of the paddle thickness, which has the function as is obvious, of ensuring that the starting points of the level variations of the paddles actually coincide with the points A B C and D as shown in FIG. 1. In FIG. 6 it can be seen that the top cam 26 is exactly complementary with respect to the bottom cam 25, with the exception of a small phase shift in advance of the points of start and end of the ascent A'' and B'' relative to A' and B' and a small delay shift of the point of start and end of the descent C'' and D'' relative to C' and D'. These phase shifts have a value which is equal to the thickness of the paddles 24.

As can be seen in FIGS. 3 and 4, the bottom cam 25 is developed circularly beneath the peripheral portion 9 of the rotor and has a width which is exactly the equal to the width of such portion, so that between the stator 1, the cam 25 and the rotor 3 an annular chamber is defined, having a height which varies between a minimum value in correspondence with the maximum elevation area of the cam 25, where the peripheral portion 9 of the rotor is in frictional contact with the cam, and a maximum value in correspondence with the minimum elevation of the cam 25. Since the paddles 24 are variously inserted in such annular chamber, a pumping action is imparted in said chamber and this action finds its vent in a tiny channel 27 formed by a horizontal portion 28 formed through the top surface of the cam portion 25 which is immediately downstream of the point B' and by a vertical portion 29 formed through the inner wall of the stator 1.

As can be seen in FIGS. 3 and 4, the top cam 26, conversely, is situated above the peripheral portion 9 of the rotor and is integral with the hood 10.

Immediately above the peripheral portion 9, the central portion 8 of the rotor is fitted with a circular groove 30, about one half of which, more exactly the part which due to the rotation of the rotor is from time to time between the filling mouth 16 and the partition diaphragm or fixed wall 11 (FIG. 1 is occupied by a fixed half ring 31 which is rotatably locked with respect to the diaphragm 11 and thus relative to the stator 1 by means of a protrusion 32 thereof.

Lastly, an opening 33 is provided which communicates with the bottom annular chamber as defined above, which has the function of giving access to the bottom annular chamber aforesaid for periodical cleaning purposes.

The operation of the pump shown in the drawings is just as follows. Due to the ascending and descending motion as imparted to the paddles 24 by the complementary cams 25 and 26, the portion of the annular chamber 15 which is comprised between the points B and C is divided into a plurality of compartments, in each of which a metered quantity of minced meat is fed out by the filling mouth 16. Due to the rotary motion of the rotor 3 these metered quantities of meat are forwarded towards the delivery mouth and go, in the last portion of their travel along the annular chamber 15, along a virtually straightforward unhindered path which prevents the meat from being subjected to slurrying, chopping or crushing action which could prejudice both the storage life and the appearance.

Air possibly entrapped by the meat is sucked back through the free portion of the groove 30 and therefrom through the vacuum tap 22. Such a suction, obviously, does not take place in the space comprised between the filling mouth 16 and the delivery mouth 17, inasmuch as in this space the groove 30 is occupied by the half ring 31. The latter has also the task of automat-

ically clearing, at every revolution, the groove **30.**

Since the paddles **24** are slidably housed and thus with a certain clearance, in the openings **23** of the rotor, it may occur that some meat may seep from the top annular chamber to the bottom annular chamber. Due to the pumping action as imparted within the bottom chamber by the paddles **24,** the meat is however sent therefrom into the tiny duct **27** and then again to the top annular chamber **16.** This fact permits that meat losses are minimized and does away with the necessity of a frequent cleaning of the portion of the stator space which is beneath the rotor.

It should be noted, lastly, that such a pump structure facilitates to the utmost the dimantling operation in order to effect the periodical washing of the pump. It is sufficient, in fact, to remove the lid **14,** to lift the hood **10** by causing the dowel **12** to slide into the groove **13** and to withdraw the rotor **3** integrally with its paddles and half ring by a specially provided tool which is to be screwed into the tapped hole **34** (FIGS. **3** and **4**). A nozzle **33** allows for the discharge of the water which effects the washing of the stator space as the pump has been disassembled.

What we claim is:

1. A rotary pump for a continuous sausage-stuffing machine, comprising a stator having a cylindrical cavity, in whose interior there is coaxially arranged a rotor rotatable about its own axis, said rotor being composed by a central cylindrical portion lifted up to a closing lid for the stator cavity and by a peripheral lowered portion so that between said lid and said rotor there is defined a top annular chamber equipped with a filling mouth formed by a hole drilled through the lid, a delivery mouth with an axis which is substantially tangent to the median circumference of said annular chamber in the direction of rotation of the rotor and a partition diaphragm arranged immediately downstream of said delivery mouth in the direction of rotation of the rotor, in said peripheral portion of the rotor there being slidably arranged radial paddles driven to slide along the rotor axis according to a preselected programme, which provides their projection from the contour of the peripheral portion of the rotor and to said lid of the stator space in an area downstream of said partition diaphragm and upstream of said filling mouth and their complete re-entering in the contour of said peripheral portion of the rotor in an area downstream of said filling mouth and upstream of said delivery mouth, said preselected programme being defined by a bottom annular cam arranged integrally with the stator beneath said peripheral portion of the rotor, with the shaped top surface of which there are engaged the bottom ends of said paddles, characterized in that said bottom annular cam has a width equal to that of the peripheral portion of the rotor and is positioned at such a level that said peripheral portion of the rotor is tangent to said cam at the point of maximum cam elevation, so that between said cam, said rotor and said stator a bottom annular chamber is defined having a variable height and into which project the lower ends of the rotor paddles, said bottom annular chamber being in communication with said top annular chamber by means of a tiny duct which is extended partly transversally of the bottom annular cam along the top surface of said cam and partly along the internal cylindrical wall of the stator.

2. A pump according to claim **1,** characterized in that above said peripheral portion of the rotor there is arranged a top annular cam, which is complementary relative to the bottom cam, with which there are engaged the top ends of the rotor paddles.

3. A pump according to claim **2,** characterized in that said top cam is integral with a hood with which there is also integral said partition diaphragm, said hood being slipped onto said central portion of the rotor and being mounted in a fixed angular position relative to said stator.

4. A pump according to claim **1,** characterized in that immediately above said peripheral portion the central portion of the rotor is equipped with a circular groove, the one half of which is from time to time between the filling mouth and the delivery mouth is filled by a fixed half ring.

5. A pump according to claim **1,** characterized in that the portion of the top annular chamber which is closer to the partition diaphragm downstream of the diaphragm is equipped with an air-sucking mouth formed through said lid.

6. A pump according to claim **1,** characterized in that said stator cavity and said rotor are so shaped as to permit the complete removal of the rotor through the end of the stator cavity which is normally closed by lid.

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