Feb. 3, 1970 J. MANTELET 3,493,022

MINCING MACHINES

Filed May 16, 1966 4 Sheets-Sheet 1

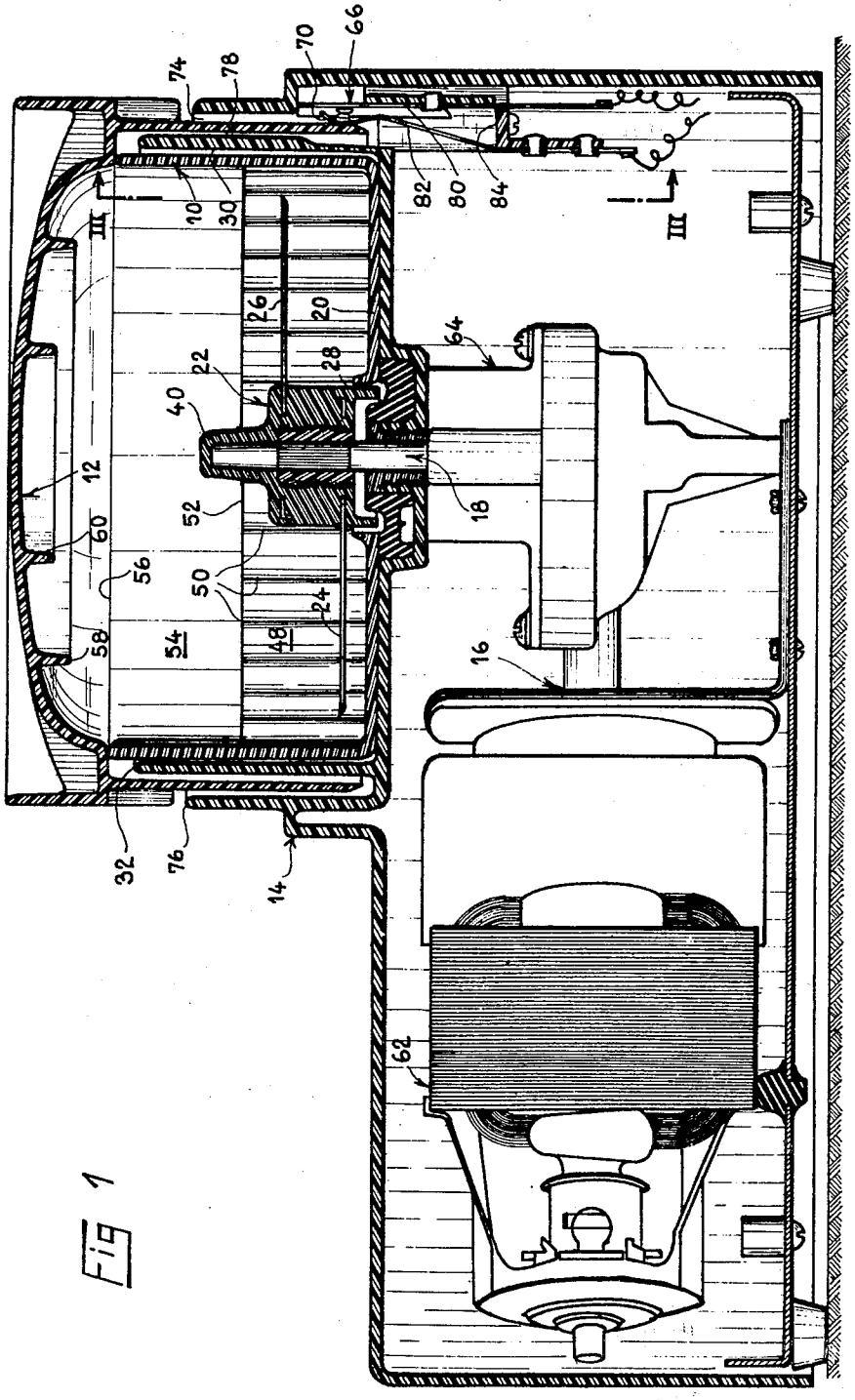

Fig 1

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MINCING MACHINES

Filed May 16, 1966 4 Sheets-Sheet 2

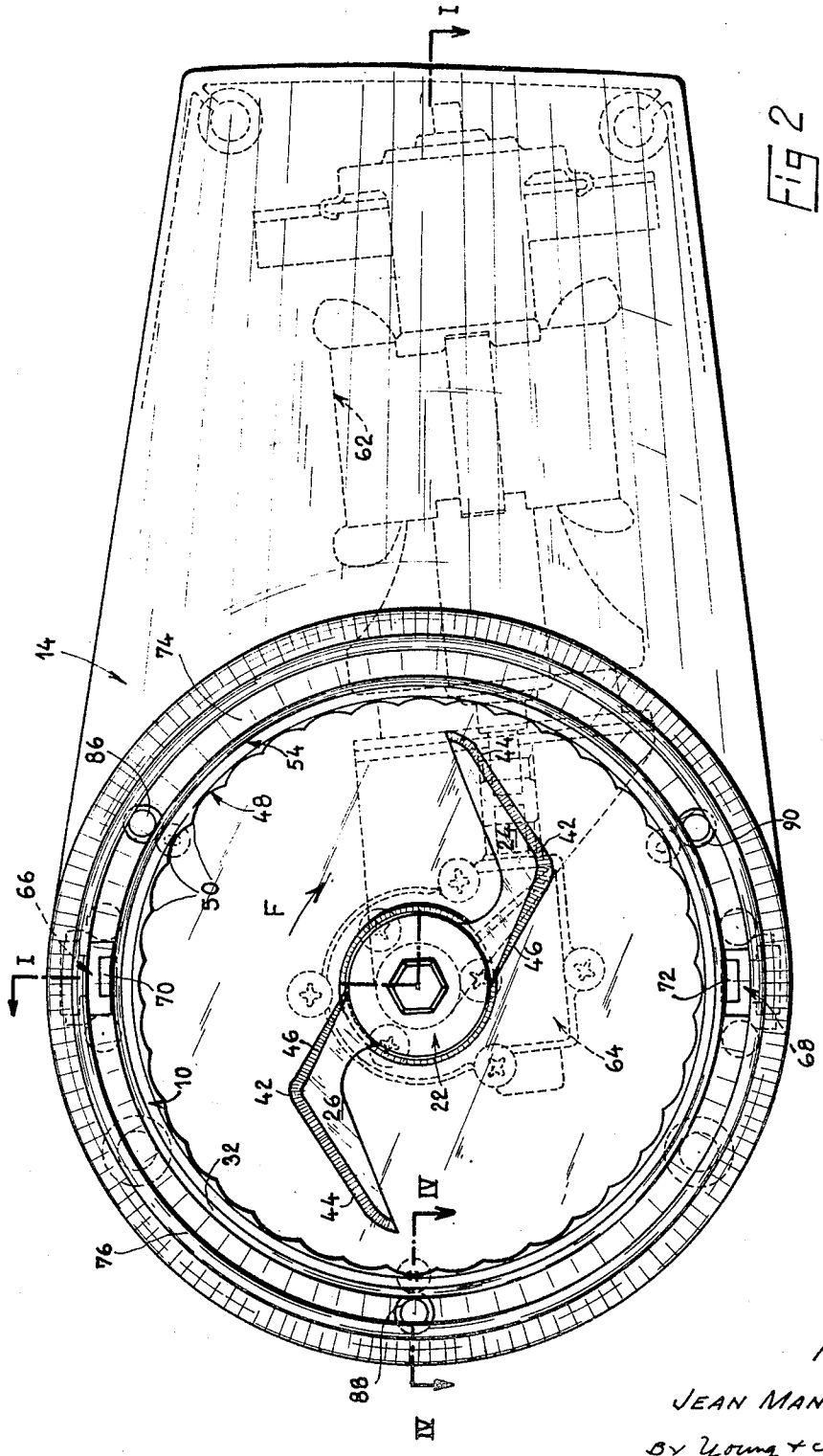

Fig 2

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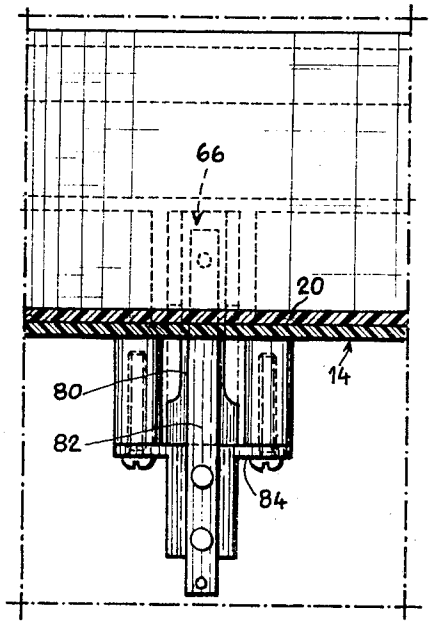

Fig 3

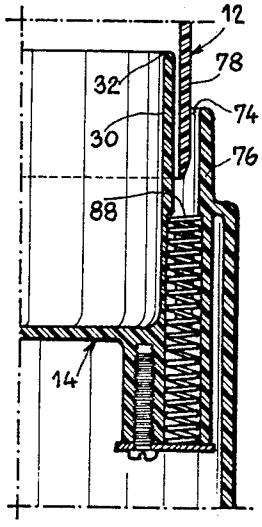

Fig 4

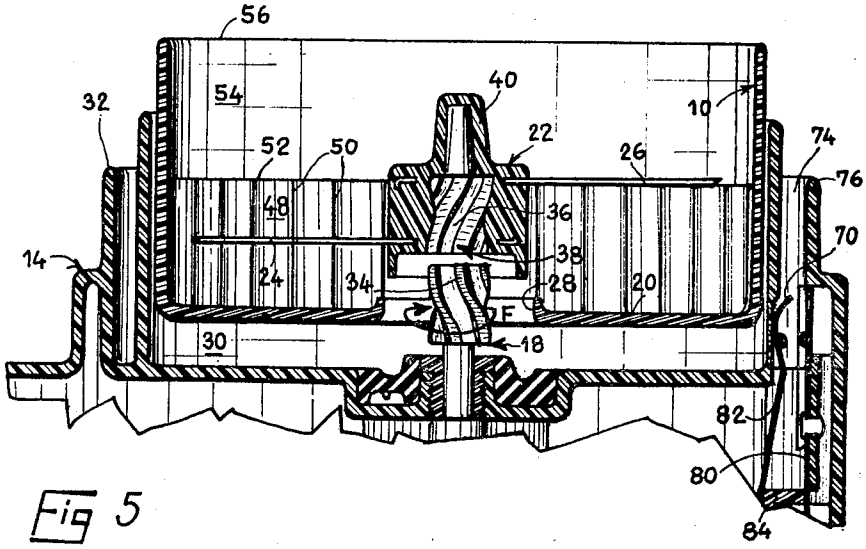

Fig 5

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MINCING MACHINES

Filed May 16, 1966 4 Sheets-Sheet 4

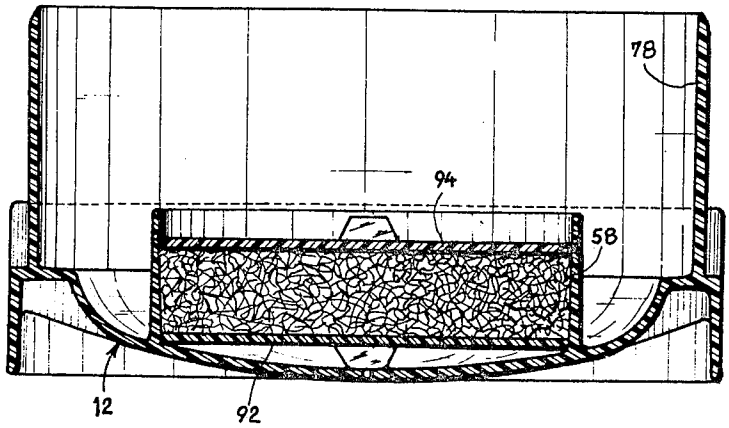

Fig 6

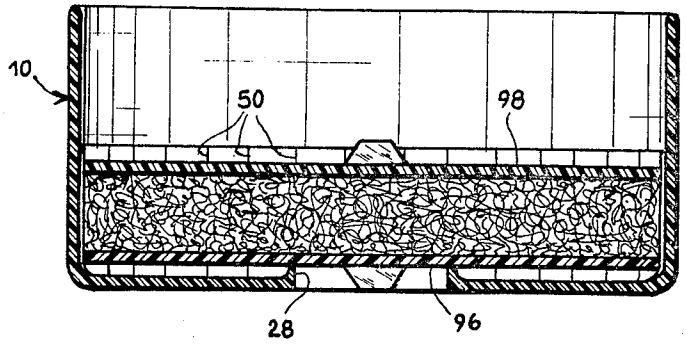

Fig 7

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United States Patent Office 3,493,022 Patented Feb. 3, 1970

3,493,022

MINCING MACHINES

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Filed May 16, 1966, Ser. No. 550,432
Claims priority, application France, May 25, 1966, 18,353
Int. Cl. B02c 13/18, 13/31
U.S. Cl. 146—68 7 Claims

ABSTRACT OF THE DISCLOSURE

A mincing machine has an upright spindle on which is mounted a hub that carries the blades. The hub is formed as a single component of plastic molded about the inner ends of the blades. The motor is housed in a lateral extension of the casing and is disposed with its axis horizontal. A removable cover has a lower skirt that fits into an annular recess to close two diametrically opposed switches in series. Springs resist the movement of the cover skirt into this recess with a force greater than the weight of the cover, so that as a safety feature, the operator must press down on the closed cover to actuate the mincer.

This invention relates to mincing machines, and more particularly to domestic mincers for finely dividing foodstuffs such as meat, fish, hard-boiled eggs, cheese, vegetables or seasoning herbs.

The main object of the present invention is to provide a small compact mincer suitable for domestic use which is more convenient and safer to use, easier to clean, and more effective and reliable in operation than mincers known hitherto.

According to the present invention, a mincing machine comprises a working bowl of generally cylindrical shape closed by a removable cover and supported on a stand containing a driving assembly, the output spindle of which passes through the central area of the bottom of the bowl and drives in rotation a hub within the bowl carrying one or more suitably sharpened blades, the blade-carrier hub being drivingly connected to the driving spindle by helical splines on the lateral surface of the spindle engaging with correspondingly shaped clearance grooves in the surface of a central bore of the hub, the pitch of the said splines and grooves being selected such that one rotation of the spindle in its normal direction of rotation fully engages the splines in the grooves.

Since the blade-carrier hub is fitted on the driving shaft only, it can easily be removed for cleaning purposes, and replaced in position by a simple movement. During the latter operation the hub need not be pushed home on the spindle since, by virtue of the inclination of the coupling ramps, this hub automatically engages correctly on the ramps as soon as the appliance is started. In addition, the risk of the blade-carrier hub slipping off the driving spindle during the operation of the appliance is minimised.

Equally in order to facilitate cleaning of the appliance after use, the invention makes provision for the working bowl to be removably mounted on the stand. To this end, the driving spindle passes freely through a central hole in the bottom of the bowl, whilst the stand has a housing or seat which removes the bowl in such a manner that centering of the bowl relative to the said spindle is ensured.

The bowl is thus merely placed on the stand, and can be removed and replaced in position by a simple movement.

To facilitate removal and refitting in position of the blade-carrier hub, the invention equally makes provision for this hub to have an upwardly directed projection by

which the hub may be grasped without the risk of the operator injuring his hands on the blades.

For the purpose of improving the safety of the appliance in operation, the invention further makes provision for the driving assembly to remain inoperative if the cover is not applied to the bowl; i.e., in the case of an electrically operated machine the electrical supply to the driving assembly is interrupted by suitable means thereby obviating the risk of the blades causing injury to the operator during their rotation.

In one preferred embodiment, which is electrically driven, the supply circuit of the driving assembly includes—in series—at least one pressure-operated switch the actuating means of which is housed in the bottom of an upwardly open cavity wrought in the stand and sufficiently narrow and deep to prevent any direct operation of the means by the operator, but arranged to receive a projection on the cover which is adapted to engage in the said cavity and to operate the said actuating means when the cover is applied on the bowl.

The cavity housing the switch preferably also contains at least one resilient element to exert an upward thrust on the projection on the cover, the stiffness of this element being such that the actuating means cannot be operated by the weight of the cover alone when the latter is placed on the appliance.

In order to ensure the starting of the appliance, a certain pressure must be exerted on the cover in position on the bowl of the appliance. One thus has the assurance that before the device is started, the cover will be firmly held on the bowl and will thus be prevented from being hurled upwards during operation owing to impact against the inner face of the cover of the substances contained in the bowl.

In order that the invention may be fully understood, various embodiments in accordance therewith will now be described, by way of example, with reference to the accompanying drawings in which:

FIG. 1 illustrates a domestic mincer of the invention in vertical section along the broken line I—I of FIG. 2;

FIG. 2 is a plan view of the mincer after removal of the cover;

FIG. 3 is a partial vertical section along the line III—III of FIG. 1;

FIG. 4 is a partial vertical section of the stand along the line IV—IV of FIG. 2;

FIG. 5 is a partial vertical section of the appliance without the lid, in which the blade-carrier hub has been illustrated uncoupled from its driving spindle and the bowl lifted off the stand;

FIG. 6 illustrates a variant embodiment of the cover, in which it forms a mould intended to shape croquettes from the substance minced;

FIG. 7 illustrates the working bowl in the case in which it forms a croquette mould itself.

Referring to the drawings, these show an electrically operated mincer comprising a working bowl **10** of generally cylindrical shape closed by a removable cover **12** and carried on a stand **14** containing a driving or motor assembly **16** whose vertical output spindle **18** traverses the central area of the bottom **20** of the bowl and within this bowl drives in rotation a hub **22** carrying two blades **24** and **26** which are parallel to the bottom of the bowl and are suitably sharpened.

The bottom **20** of the bowl has a wide central hole **28** (FIG. 5) through which passes freely the driving spindle **18**, and the stand **14** has a housing **30** formed by a cylindrical wall or enclosure **32** which receives the bowl and ensures its centering relative to the spindle **18** as well as its retention against any angular displacement. As is more clearly apparent from FIG. 5, the coupling between

ıe blade-carrier hub **22** and the driving spindle **18** is ·oduced by means of inclined ramps or fins **34** wrought ı the lateral surface of the spindle, on which are enıged with a clearance correspondingly inclined grooves 5 wrought in the lateral surface of a central bore **38** of ıe hub, the inclination of these fins and grooves being :lected such that one rotation of the spindle **18** in its norıal direction of rotation (arrows F of FIGS. 5 and 2) nds to engage the fins **34** in the grooves **36**, that is to say ı draw the hub **22** downwards. To obtain such an autoıatic engagement of the hub **22** on the spindle **18** as soon ; the appliance is started, and equally to ensure that this ıb cannot fly off the spindle **18** during operation in any ıse, the angle of inclination of the fins and grooves **34** ıd **36** to the vertical should lie between 20° and 40°, ıd preferably between 25° and 35°. For example, if the ub **22** and the fins **34** are made of a plastic material ıch as "Nylon," an angle of approximately 30° is parcularly appropriate.

As will be seen from FIGS. 1 and 5, the hub **22** is ›rmed by a single component of plastic material, and the lades **24** and **26** are fastened to this hub by overmouldıg this component on the blades during production. This ıb has an upwardly directed projection **40**, forming a ıanipulating handle.

The blades **24** and **26** extend in opposite directions from ıe hub **22**. The blade **24** is situated in a plane close to ıe bottom of the bowl, whereas the blade **26** is situated ı a plane which is offset upwards relative to the plane f the blade **24**. The sharpened active edge **42** of each lade (FIG. 2) is angled rearwards on the radius relave to the direction of rotation and has two reactilinear :ctions **44** and **46** joined by a curved section, the outer :ction **44** being more extensively angled rearwards than ıe inner section **46**. This form assures satisfactory peneation of the blades into the material to be minced.

The span of the blades, measured from tip to tip, is f the order of nine-tenths of the internal diameter of the ›wl **10**. It will be noted in this connection that too :eat a radial extension of these blades would result in ‹cessive load on the motor, specifically when the apliance is used to process tough meats, or would require ›plication of a motor of a size incompatible with the ›mpact nature of the appliance. On the other hand, if ıese blades are too short, the mincing work is not per›rmed in sufficiently uniform manner, and a span equal › approximately nine-tenths of the diameter of the bowl ssures adequate uniformity of the mincing work, without owever imposing excessive load on the motor.

The inner lateral face of the bowl **10** comprises a lower :ction **48** which has grooves or flutes **50** extending ver·cally, and which extends from the bottom **20** up to a :vel **52** situated above the plane of the upper blade **26**, ; well as a smooth upper section **54** which extends up › the top edge **56** of the bowl. The inner face of the cover **2** has two circular webs or fins **58** and **60** concentric ·ith the axis of the cover and of the bowl.

The flutes of the lower section **48** of the inner face of ıe bowl have the function of braking the material to e minced, which within the working space tends to spin t the same speed as the blades, thus causing it to remain ı engagement with the blades. The smooth section **54** as ·ell as the webs **58** and **60** of the cover on the contrary llow the material to be minced to circle freely in the uper part of the bowl without sticking to the side, and thus romote its return into the range of action of the blades.

As is apparent in FIG. 1, the driving assembly **16** omprises an electric motor whose axis extends horizonılly, followed by a gearbox **64** whose vertical output pindle forms the driving spindle **18** of the blade-carrier ub **22**. The motor **62** is a motor of universal type turnıg at high speed. The gearbox **64** contains a speed reducon mechanism adapted to reduce the speed of the spinle **18** to a value lying between 3,000 and 8,000 revolu-

tions per minute, when operating respectively under full load, and without load.

To ensure safe operation of the appliance in this embodiment, the electric supply to the motor **62** depends on the application of the cover **12** on the bowl **10**. To this end, the supply circuit of the motor **62** includes in series two switches **66** and **68** whose actuating knobs or keys **70** and **72** are housed at diametrically opposed points in the bottom of a narrow annular cavity **74** formed between the centering partition **32** of the bowl and a second cylindrical partition **76** adjacent thereto and extending from the stand **14**, whereas the cover **12** close to its edge has a downwardly extending cylindrical skirt **78** adapted to engage in the cavity **74** and to operate the keys **70** and **72** when the cover **12** is placed on the bowl **10**. Each switch comprises two blades **80** and **82** (FIGS. 1 and 5) each carrying a contact and being upwardly directed from an insulating bracket **84** internal to the stand **14**; the blade **82** is flexible and has an upper extremity outwardly inclined relative to the vertical and forming the key **70** or **72** housed in the bottom of the cavity **74** for reception of the descending skirt **78** of the cover **12**. The lower edge of this skirt itself has an inclined profile adapted to slide in contact with and actuate the keys **70** and **72** when the cover is placed in position, thus causing the flexible blades **82** to bend towards the fixed blades **80**, and causing the switches to close.

The housing cavity **74** of the switches **66** and **68** also contains three return springs **86**, **88** and **90** (FIG. 2) adapted to repel the skirt **78** of the cover upwards. The stiffness of these springs is such that the weight alone of the lid **12** when placed on the appliance, is insufficient to deflect the springs enough to enable the skirt **78** of the cover to operate the actuating keys **70** and **72** of the switches.

Since the closing of the switches **66** and **68** depends on the placing in position of the cover on the bowl, the operator does not risk injury by placing the hand on the blades during their rotation. In addition, owing to the fact that there are two switches, it will be understood that the jamming of one of them by accident in its closed position does not jeopardise the safety of the appliance. Moreover, owing to the fact that these switches are widely separated, one is certain that a child cannot be injured if it manipulates the switches by means of tools or other objects, since it must use both hands to do so.

Owing to the presence of the springs **86**, **88** and **90**, the operator must, in order to ensure the starting of the appliance, not only place the cover on the bowl, but must also exert a certain pressure thereon. One thus has the assurance that the cover will be held firmly on the bowl during operation of the machine thus preventing it from being flung upwards owing to impact against the inner face of the cover of the materials contained in the bowl.

The bowl **10** and the blade-carrier hub **22** are easily removable, which facilitates their cleaning. Refitting the blade-carrier hub in position on its driving spindle does not entail any difficulty: in point of fact, it is unnecessary for the housewife to push the hub home on the spindle since, by virtue of the inclination of the coupling ramps or fins **34**, this hub is engaged automatically and correctly on the fins as soon as the appliance is started. In addition, there is no risk of this hub flying off the driving spindle during the operation of the appliance.

It will be noted that the arrangement of the motor **62** shelters it from slight leaks of water or other liquid which could occur around the spindle **18**. It will be noted in this connection that a sealed passage has been arranged at the point at which the spindle **18** passes through the stand, but that on the contrary no sealing is provided at the point at which the spindle **18** passes through the bottom of the bowl, which does not raise any difficulties since the materials to be minced contain practically no liquid.

As illustrated in FIGURE 6, the invention makes provision for the cover **12** to form a mould intended to shape croquettes from the substance minced by means of the appliance: to this end, the circular web **58** of the cover has been extended to a sufficient height for the compartment it surrounds to contain the amount of substance intended to form a croquette, whereas the mould thus formed is associated with a base plate **92** and a pressure plate **94**, both being circular and adapted to engage in this compartment. To facilitate production, the plates **92** and **94** are identical.

As shown in FIGURE 7, the bowl **10** may itself form a croquette mould. It is co-ordinated with a base plate **96** and a pressure plate **98**.

What is claimed is:

1. A mincing machine comprising a working bowl of generally cylindircal shape closed by a removable cover and supported on a stand containing a driving assembly having an output spindle which passes through the central area of the bottom of the bowl and rotatably drives a hub within the bowl carrying at least one sharpened blade, characterized in that the blade-carrying hub is formed as a single component of moldable material, said at least one blade being fastened to the hub by overmolding the hub thereon during production.

2. A mincing machine as claimed in claim **1**, the blade-carrying hub being drivingly connected to the output spindle by helical splines on the laterial surface of the spindle engaging with correspondingly shaped clearance grooves in the surface of a central bore of the hub, the pitch of said splines and grooves being such that one rotation of the spindle in its normal direction of rotation fully engages the splines in the grooves.

3. A mincing machines as claimed in claim **1**, in whch the sharpened edges of said at least one blade are angled rearwardly on the radius relative to the direction of rotation.

4. A minicing machine as claimed in claim **3**, in which said sharpened edges comprise two substantially rectilinear sections connected by a curved section, the outer section being more extensively angled rearwardly than the inner section.

5. A mincing machine as claimed in claim **1**, in which the radial extent of each blade is equal to approximately 9/10th of the internal radius of the bowl.

6. A mincing machine as claimed in claim **13**, in which the inner lateral face of the bowl comprises a lower section which has vertically directed fluting and which extends from the bottom up to a level situated above the plane of the upper blade, and a smooth upper section that extends up to the top edge of the bowl.

7. A mincing machine as claimed in claim **1**, said cover having at least one downwardly depending circular web on its under side concentric with the axis of the cover and of the bowl.

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