(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 783 940 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.07.1997 Bulletin 1997/29

(51) Int. Cl.[6]: **B26D 1/38**, B26D 9/00, B26D 5/20, B26D 1/62

(21) Application number: **97100143.3**

(22) Date of filing: **07.01.1997**

(84) Designated Contracting States:
DE FR GB IT

(30) Priority: **10.01.1996 IT GE960004**

(71) Applicant: **SASIB S.p.A.**
I-40128 Bologna (IT)

(72) Inventor: **Spada, Valter**
40043 Marzabotto (BO) (IT)

(74) Representative: **Karaghiosoff, Giorgio Alessandro, Dipl.-Phys.**
Via Pecorile 27/B
17015 Celle Ligure (Savona) (IT)

(54) Apparatus and method for cutting or perforating web materials

(57) An apparatus for making partial or complete cuts and incisions on tapes made of paper, plastic material, tinfoil, or similar, comprises at least one cutter (11, 12) or any other incision tool, and a countercutter (5) or any other cooperating striking tool, at least one of them being supported rotatably, and the tape (15) made of one of the said materials being made to pass between them. According to the invention, one of the two cooperating cutting, notching and incising tools (11, 12, 5), particularly the cutter (11, 12), is alternately movable, preferably through oscillation, into an operating position and into an idle position, and is stationary during the operation of cutting, incision, or similar, executed in cooperation with the other tool, that is the countercutter (5), while the latter rotates at a speed which is markedly higher than the speed of continuous sliding of the tape (15), made of one of the said materials, between the two tools (5, 11, 12).

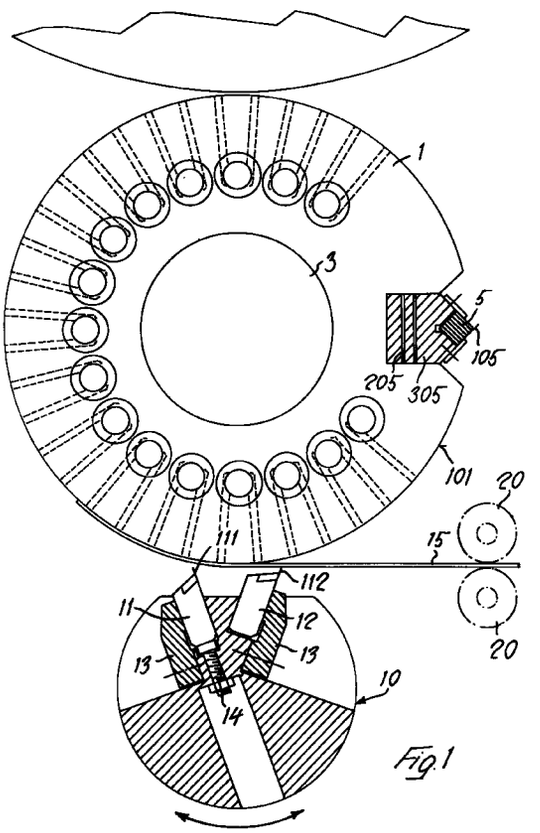

Fig. 1

EP 0 783 940 A2

Description

The invention relates to an apparatus for making partial or complete cuts and incisions on tapes made of paper, plastic, tinfoil, or similar, which comprises at least one cutter or any other incision tool, and a countercutter or any other cooperating striking tool, at least one of them being supported rotatably and the tape , made of one of the said materials heing made to pass betwen them.

In particular, the invention relates to apparata of the said type whose function is to prepare and cut off the wrapping slips in cigarette packing machines, or similar.

With particular reference to the said cigarette packing machines, the foil slip which is wrapped around the cigarettes to form the inner wrapping of the pack, is sheared out of a continuous tinfoil tape. The tape has a predetermined width, adapted to the axial length of the cigarettes, and the slip is cut off through a tranverse cut made by a cutter interacting with a countercutter. Moreover, particularly in rigid packs, the area of the slip which corresponds to the opening, on the front upper side of the box, must be designed to be easily separated from the rest of the slip, in order to provide access to the cigarettes while opening the pack. Therefore, the slip is to be provided with at least one predetermined tearing line, comprising a partial notch parallel to the axis of the cigarettes and at least one partial notch transverse to the axis of the cigarettes, commected to the former.

Prior art apparata for making the said partial cuts and notches include cutters and countercutters which are both rotatable, at such speeds that the said partial cuts, notches or incisions are inclined to a certain extent with respect to the direction perfectly perpendicular to the longitudinal axis of the tape. Furthermore, when a change of the length size of the slip is needed, particularly, but not exlusively in case of shorter slips intended for use in smaller cigarette packages, the ratio between the relative speeds of the cutting means and the speed of advance of the tape is such, that the cutting or incising means may generate burs at the cut or incision line and/or eventually damages to the slip itself. These damages may be particularly serious when incomplete cuts are to be made, that is when the cutter is made in such a way as to provide for partial notches, spaced by material-mede bridges, that is predetermined tearing lines. In the machines with both rotating cutters and countercutters, in order to ensure the correct synchronicity between cutters and countercutters and the tape itself, even when the slip format is changed, the diameter of the circular path of the rotating cutter and/or countercutter must be changed accordingly. By changing the diameter of the path of the rotating cutter or countercutter, the dimensions of the supporting means of the latter are affected as well. Said means usually comprise rotating drums, which are supported overhangingly on axles or shafts, and whose size reduction produces a lower supporting stability. A lower supporting stability of the cutter and the countercutter may cause an inaccurate positioning of the two cooperating tools, leading to a lower life of the latter, to not clean, faulty or partial cuts, as well as to tool damages.

The invention aims at producing an apparatus of the type described initially which, thanks to relatively simple and cheap expedients can help to obviate the above mentioned drawbacks, by ensuring a high accuracy in cutting, notching, incising, etc., a constantly correct use of the tool and an effective and simple compatibility with different formats, without affecting the operational functionalities and the quality of the results.

The invention achieves the above objects with an apparatus of the type described initially, in which one of the cooperating cutting, notching or incising means, particularly the cutter, is alternately movable, preferably through oscillation, into an operating position and an idle position, and is stationary during the cutting, incision, or similar, performed combiningly with the other tool, that is the countercutter, while the latter rotates continuously at a speed which is markedly higher than the speed of continuous sliding of the tape, made of one of the said materials, between the two tools.

According to an improvement, when two cuts, incisions or similar of different lengths are to be made in different areas of the tape, for example in the case of cutoff and preparation of a wrapping slip with a tear-removable area, known as pull, there are provided two cutters mounted on the same supporting means, and alternately swung into an operating cooperation position, in which at least one countercutter is supported rotatably along a circular path about an axis parallel to the swinging axis of the two cutters.

The speed of rotation of the countercutter and the oscillations of the cutters are to be related to each other and to the sliding speed of the tape passing between the latter, in such a manner as to ensure cooperation between the cutters and the corresponding countercutter in order to perform the desired operation on the predetermined areas of the tape.

Advantageously, the cutter or cutters and the countercutter or countercutters are mounted on the periphery of cylindrical or substantially cylindrical drums, respectively driven into reciprocating continuous rotation along a circle arc, and about their axes.

The diameters of the cutter drum and the countercutter drum are considerably shorter when compared to the thickness of the tape made of one of the above mentioned materials, while the cutters protrude to such an extent, that the distance between their cutting blades and the peripheral surface of the countercutter drum is slightly longer than the thickness of the tape and substantially in the same order of magnitude as the radial protrudence of the blade of the countercutter from the peripheral surface of the associated supporting drum, that is as the size required to perform the predetermined cutting, notching, incising action.

In particular, the countercutter drum is made to be suction operating at least on part of its extension and the suction power, that is vacuum, is controlled in such

a way as to retain the tape made of one of the said materials on its peripheral surface, allowing the drum to perform a relative slipping movement on the tape, which is driven at a lower sliding speed.

Thanks to the above expedients, the invention helps to effectively obviate the drawbacks coming from improper relative speeds of the cutting tools in relation to each other and to the tape, and from the instability of the supporting means for the cutting tools in case of format change. As the countercutter drum rotates at a higher speed than the tape, and as the cutter is stationary, the relative speeds between the cutter and the countercutter are very high. The cut is made without following effects, and as fast as to obtain very slight divergences between the cutting orientation and the orientation perfectly perpendicular to the length of the tape. Moreover, thanks to this fast cutting, the occurence of burs or damages to the slip along the cutting line is avoided. The whole ensures perfect performance of a scissors-cutting operation, in which the cutter and the countercutter always cooperate substantially theoretically and with good approximate results, only on one point of their length, which moves simultaneously with the movement of the cutter on the countercutter from one end to the other of the latter.

In particular, interferences are avoided between the cutters and the countercutter/s and the cutoff line of the slip, thanks to the particular dimensions of the drums supporting the tools. As the distance of the cutter blades is slightly longer than the tape thickness, when the countercutter is not in the position of cooperation with one of the two cutters, the oscillation of the latter into the operating position does not involve contact or any other action on the tape made of one of the said materials, sliding adherently to the suction operating countercutter drum, at a slight distance from the cutting blade of the cutters. Thanks to the fact that the countercutter drum is suction operating, and rotatable at a higher speed than the sliding tape itself, the slip, while being cut off from the tape, is retained on the drum and accelerated forwards with respect to the tape itself. The initial end of the tape comes to be staggered backwards with respect to the countercutter blade, which moves at a higher speed than the tape itself. The sheared slip, on the contrary, moves away from the blade of the stationary cutter, at the point of curvature of the suction peripheral wall of the countercutter drum, and is accelerated, after the cut, to the speed of the countercutter, keeping its relative position with respect to the latter, so that the rear edge of the slip - with regards to the sliding direction of the tape and to the direction of rotation of the countercutter drum - does not interfere with the cutting-edge of the countercutter itself.

By properly adjusting speeds, an operative configuration may be obtained, in which the two cutters are alternately driven, without rest phases, by simply swinging with a predetermined rate, the cutter drum into the angular operating position of the one and the other cutters respectively.

The definition of cutter and countercutter or of any other tool and its corresponding striker, in the above description and in the dependent claims is obviously to be intended as purely relative, as there can be provided, alternatively to what described above, a pair of countercutters supported so as to be alternately swung into operating positions, and cooperating with only one cutter, mounted so as to protrude from the periphery of a suction supporting drum, continuously rotating.

The invention has a number of other improvements which are the object of the appended claims.

The features of the invention and the advantages derived therefrom will become more aparent from the following description af a non limiting example of embodiment, illustrated in the annexed drawings, in which:

Fig. 1 is a schematic view of the apparatus according to the invention.

Fig. 2 is a sectional view of the apparatus according to fig. 1, with respect to a plane passing through the axes of the two cutter and countercutter drums.

Fig. 3 is a magnified axial sectional view of the two drums according to fig. 2 with the cutter and countercutter in their operating position.

Fig. 4 schematically shows the inclination of the reciprocal orientation of the blades of cutters an countercutters for achieving a scissors cut.

Fig. 5 shows a slip with transverse cuts, shearing cuts and partial tearing cuts for detachment of the pull, the said cuts being made by means of an apparatus according to the preceding figures.

Fig. 6 is a sectional view analogous to fig. 2 of the apparatus according to a further improvement of the invention.

Fig. 7 shows a slip with transverse cuts, shearing cuts and partial cuts having a different distribution as in the example of fig. 5 and obtained with the improved apparatus of fig. 6.

With reference to fig.1, an apparatus for making partial or complete cuts and incisions on tapes made of paper, plastic, or similar, particularly on tapes made of tinfoil and in cigarette packing machines comprises a first suction drum 1, which is mounted rotatably about its own axis on a drive shaft 3 supported by the framework 4. On its periphery, the drum 1 holds a cutting tool, particularly a countercutter 5, which is disposed with its blade 105 orientated so as to be substantially parallel to the axis of rotation of the drum 1. The countercutter 1 is supported in such a manner as to be elastically compliant, by springing means of any type which, in the example of embodiment include an element 305, made of a suitable material, particularly metal, with a predetermined intrinsic elasticity, with apertures 205 in it passing transverse to the axis of rotation and extending in the axial direction. The countercutter 5 is supported with its blade 105 radially protruding to a certain extent outwards beyond the peripheral covering surface 101 of the

drum 1. Moreover, the drum 1 is made to be suction-operating, being supplied with a plurality of radial holes 201, which communicate with a distribution chamber 301 extending like a cylindrical sector with a predetermined angular width. At the outer end of the drum 1, the distribution chamber 301 is open and rotatably seals an annular flange 6, which has, in certain predetermined areas, holes 106 connecting alteratively to atmospheric pressure or to a pressure source, the said holes being arranged at the same radial distance as the distribution chamber 301 of the drum 1.

Advantages may be drawn in the positioning of the drum 1, through shaping the shaft 3 as a truncated cone, tapering in the direction of its end on the free frontal side of the apparatus. In this area, the shaft has an extension 103, which rotates freely, by means of bearings 7, inside a door, provided with a grasping handle 107, and with removable locks, for example clamping means 9, to a front plate 104, which is an integral part of the framework 4 of the apparatus. By this expedient, the drum 1 may be easily removed from the apparatus when an adjustment or replacement of the countercutter is needed, by simply releasing the door 8 and extracting the drum from the truncated cone-shaped shaft 3; no associated complex positioning phase is required.

Directly next to the first drum 1, particularly beneath it, there is provided one more cutter drum 10.

The cutter drum 10 is supported exactly like the countercutter drum 1, so as to be extractable on a drive shaft 16, its housing being closed on the front side of the apparatus by a removable door 8', which holds a bearing 7 rotatably supporting a front extension 116 of the shaft 16, whereas the removable door 8' is screwed to the frontal plate 104 of the framework 4.

On the cutter drum 10, two cutters 11, 12 are mounted with a radial orientation and in two different angular positions. The cutters may be mounted in a usual way, by means of clamping means 13, while the cutters 11, 12 are supported so as to be adjustable with respect to the radial position of their cutting-edges 111, 112, for example by a radially orientated threaded pin 14, acting as a moving striker for the radially inner side of the cutters 11, 12.

The cutters 11, 12 are orientated with their cutting-edges 111, 112 in a position substantially parallel to the axis of the cutter drum 10. In particular, as fig. 4 show, in order to obtain a scissors cut, the cutters and/or the countercutter are orientated in a slightly staggered way with respect to each other and/or to the axis of the corresponding drum 1, 10.

The distance between the cutter drum 10 and the axis of the countercutter drum 1 is such that, while the countercutter 5 is not cooperating with one of the two cutters 11, 12, the tape 15, made of one of the said materials, sliding on the countercutter drum 1 and being retained adherently against the latter through suction, passes at a certain slight distance from the blades of the two cutters 11, 12, whatever position they may take.

The countercutter 5 protrudes outwards from the suction peripheral cover of the drum 1, to such an extent, as to push the tape 15 against the cutter which is in its respective operating position.

The two drive shafts 3 and 16 of the two drums 1, 10 extend on the rear side, connecting their ends, opposite to the ends supporting the drums 1 and 10, to driving means, all driven by one motor, not shown. The shaft 3 of the countercutter drum 1 is driven into continuous rotation by a gearing 17, which also drives a parallel axes oscillator, whose exit shaft 118 is dynamically connected to the drive shaft 16 of the cutter drum 10. The parallel axes oscillator 18 drives, the cutter drum 10, while synchronizing it to the rotation of the countercutter drum 1, into an a reciprocating motion of rotation, whose angular width and frequencies are such that one of the two cutters 11, 12 is swung, alternately to the other, into the rest position and into the operating cutting position.

Thanks to the distance of the tape 15 made of one of the said materials, during the oscillation of the cutter drum 10, the cutters 11, 12 do not come into contact with the tape 115 itself, therefore the latter cannot be subject to damages.

With reference to fig. 5, in a cigarette packing machine, the two cutters 11, 12 can be used for making a shearing cut T1 of the slip F out of the tape 15, and for making, in an intermediate area of the said slip F, a partial cut for a predetermined tearing T2 of one portion P of the slip F, known as pull. In this case, the cut T2 does not extend for the whole width of the tape 15, made of one of the said materials, and is not continuous along its extensions, but has substantially equidistant spacings of material-made bridges.

As shown in figs. 3 and 4, on the cutter drum 10 two drums are mounted, the one 12 which is intended to make the continuous transverse cut T1 for shearing the slip out of the tape 15 and the other 11, which is shorter, meant to make the partial cut T2 for the tearing of the pull P.

In order to ensure the correct sliding speed to the tape 15, which is slower than the suction countercutter drum 1, for the right positioning of the partial cut T2, the corresponding cutter 11 is led first into its operating position, and subsequently the drum 10 is swung into the angular operating position of the cutter 12 to make, later on, the shearing cut T1.

Figs. 3 and 4 also show that the cutter 12, which is intended to make the shearing cut T1, has a continuous blade 112, whereas the cutter 11, which is intended to make the cut for tearing the pull P has a blade 111, provided with regularly spaced recessed notches.

The driving speed of the two drums 1, 10 and the sliding speed of the tape 15 are adjusted in such a manner, that the cutter drum 10 is carried alternately, and continuously, without rest steps, from the operating position of a cutter 11 to the operating position of the other cutter 12. This arrangement is ensured by the lower speed of motion of the tape, with respect to the peripheral speed of the countercutter drum 1. The

lenght of the slip F is determined by the speed of advance of the tape 15, while the speed of the countercutter drum 1 and the ratio between the latter and the frequency of the reciprocating rotating motion of the cutter drum 10 determines the relative positions of the two cuts T1, T2.

If the countercutter drum 1 is dynamically constrained by the speed of advance of the tape 15, in that it always moves at a speed which is twice the sliding speed of the tape 15, then, whatever the speed of advance of the tape, and so whatever the size of the tape, the two cuts T1, T2 will always have substantially identical proportionate positions inside the slip F.

The invention is naturally not limited to the embodiment providing only two cutters 11, 12 and one countercutter 5. There may be additionally provided multiple countercutters and/or multiple cutters, cooperating in the same way, and there may be provided alternatively or combiningly with the cutters and countercutters other different incising tools, or similar.

The invention is thus not limited to the embodiments described and illustrated herein, but may be varied, especially as regards construction, without departure from the guiding principle above disclosed and claimed below.

The further improved embodiment shown in figure 6, has substantially the same construction as the one illustrated in figure 2. The only differences lies in the fact, that the countercutter drum 1 and the cutter drum 10 are disengaged relatively to their motion and that the oscillating cutter drum 1 may show a third angular position in which the cutters 11, 12 are inactive i.e. in which said cutters 11, 12 do not cooperate with the counter cutter 5.

In this example the motion of the two drums 1, 10 is also disengaged relatively to the motion of the tape 15.

Each drum 1, 10 is driven by a separate motor M1, M2. The two motors are connected to each drum by mean of the gear 17 and of the parallel axis oscillator, which in this example do not show any dynamic connection as in fig.2.

The tape 15, is fed either by separate traction or feeding means as the feeding drums 20, while in this case the suction on the tape exercised by the countercutter drum 1 has only the function of holding the tape 15 in place against the drum 1 itself, or by the countercutter drum 1 itself and in this case the drums 20 will have the function of a break which will lower the speed of the tape 15 relatively to the peripheral speed of the drum 1. In both cases the traction or feeding means and the breaking means may be driven separately and in such a way to change the tape speed relatively to the peripheral speed of the drum 1.

Encoder means 21 which read the angular motion of the two motors M1, M2 of the two drums 1, 10 furnish the control signal to a control unit 22 through which it is possible to regulate and set a particular relationship between the motion of the two drums 1, 10 one with respect to the other and relatively to the motion of the tape 15.

Thus the improved embodiment of the invention allows to modify the relationships of synchronisation of the motion of the two drums 1, 10 the one relatively to the other and each of the two drums relatively to the motion of the tape 15, thus modifying the distribution, i.e. the reciprocal distance, the kind of cuts and their number on the tape.

A first particular proceeding for making partial or complete cuts and/or incisions on tapes which can be used with the embodiment according to fig. 6, comprises the steps of modifying the rate of the peripheral speed of the countercutter drum 1 relatively to the feeding speed of the tape 15.

In this case the frequency and the direction of the sequence of steps of oscillation of the cutter drum 10 may be fixed. Modifying the above mentioned rate one can affect the distance of the cuts on the tape 15.

The disengagement also of the motion of the cutter drum 10 allows, in combination with the above mentioned variation of the ratio between peripheral speed of the countercutter drum 1 relatively to the speed of the tape 15, not only to modify the distance between two following cuts, but to change also the sequence of the different kinds of cuts.

Alternatively to the above mentioned proceeding. A change in the distance of the following cuts can be also achieved by changing the ratio of the frequency of oscillation of the cutter drum 10 relatively to the peripheral speed of the countercutter drum 1.

In this case, the cutters 1, 12 can be alternatively brought in the active position at the exact moment for having the next cut in the desired position relatively to the previous one.

Advantageously in the case of both the proceedings, the inactive angular position of the cutter drum 10 is provided symmetrically between the active angular positions of the two cutter blades 11, 12.

The example of figure 7 shows a simple result of the variation of the ratio between peripheral speed of the countercutter drum 1 and feeding speed of the tape 15.

On the contrary to fig. 5, in which a short cut has been made on the tape 15 between two complete cuts, in this example two intermediate cuts, particularly short cuts T2, are made on the tape 15 between the two complete cuts T1 at both ends of the slip of predetermined length.

Both the intermediate cuts T2 have a prefixed distance one to the other and from the long cuts T1.

By simply modifying one of the above mentioned rates the distances between the cuts T1, T2 can be varied, and by modifying also the sense of rotation of the motor M2, different cutter 11, 12 can be brought in the active cutting position, in this case varying the kind of the cuts T1, T2 in the sequence of cuts to be made.

Having a pair number of cutter, for example only the two cutter, the inactive angular position of the cutter drum may be advantageously chosen in a intermediate,

preferably symmetrical, angular position between the cutter. In this way it is ensured that for bringing every cutter in the active or inactive position the angular displacement of the drum 10 will be always the shorter one.

Obviously, the cutter drum 10 may support a greater number of cutter than only the two ones shown.

The advantages appear clearly from the above description of this embodiment. Indeed the device according to the present invention can be adapted very freely and in a simple and rapid way to what ever kind of slip is needed or desired, without requesting any constructive modification of the device, such as adding or changing of parts.

Claims

1. Apparatus for making partial or complete cuts and incisions on tapes made of paper, plastic material, tinfoil, or similar, comprising at least one cutter (11, 12) or any other incision tool, and a countercutter (5) or any other cooperating striking tool, at least one of them being supported rotatably, and the tape (15), made of one of the said materials being made to pass between them, characterized in that one of the two cooperating cutting, notching and incision tools (11, 12, 5), particularly the cutter (11, 12), is alternately movable, preferably through oscillation, into an operating position and into an idle position, and is stationary during the operation of cutting, incision, or similar, executed in cooperation with the other tool, that is the countercutter (5), while the said other tool (5) rotates continuously at a speed which is markedly higher than the speed of continuous sliding of the tape (15), made of one of the said materials, between the two tools (5, 11, 12).

2. Apparatus as claimed in claim 1, characterized in that, when two cuts (T1, T2), incisions or similar of different lengths are to be made in different areas of the tape (15), for example in the case of cutoff and preparation of a wrapping slip (F) with a tear-removable area, known as pull, there are provided two cutters (11, 12) mounted on the same supporting means, and alternately swinging into an operating cooperating position with a single countercutter (5), which is supported (1) rotatably on a circular path about an axis parallel to the oscillating axis of the two cutters (11, 12).

3. Apparatus as claimed in claims 1 or 2, characterized in that the speed of rotation of the countercutter (5) and the oscillation frequency of the cutters (11, 12) are to be related to each other and to the sliding speed of the tape (15) passing between the latter, in such a manner as to ensure cooperation between the cutters (11, 12) and the corresponding countercutter (5) in order to perform the desired operation on the predetermined areas of the tape (15).

4. Apparatus as claimed in one or more of the preceding claims, characterized in that it may have one or more cutters (11, 12) and one or more countercutters (5).

5. Apparatus as claimed in one or more of the preceding claims, characterized in that the cutter or cutters (11, 12) and the countercutter (15) or countercutters are mounted on the periphery of cylindrical or substantially cylindrical drums (10, 1), respectively driven into reciprocating continuous rotation along a circle arc, and about their axes.

6. Apparatus as claimed in one or more of the preceding claims, characterized in that the diameters of cutter drum (10) and the countercutter drum (1) are considerably shorter when compared to the thickness of the tape (15), made of one of the above mentioned materials, while the cutters (11, 12) protrude to such an extent, that the distance between their cutting-edges (111, 112) and the peripheral surface of the countercutter drum (1) is slightly longer than the thickness of the tape (15) and substantially in the same order of magnitude as the radial protrudence of the blade (105) of the countercutter (5) from the peripheral surface (101) of the associated drum (1), that is as the size required to perform the predetermined cutting, notching, incising action, whereas the countercutter drum is made to be suction-operating on its peripheral cylindrical surface (101), and at least on some areas of it.

7. Apparatus as claimed in claim 6, characterized in that the countercutter drum (1) is made to be suction-operating (201, 301) at least on one area of its extension and the suction power, that is vacuum, is controlled in such a way as to retain the tape (15) made of one of the said materials on its peripheral surface (101), allowing the drum (1) itself to perform a relative slipping movement on the tape (15), which is driven at a lower sliding speed than the speed of rotation of the said countercutter drum (1).

8. Apparatus as claimed in one or more of the preceding claims, characterized in that the cutter and countercutter drums (10, 1) are dynamically connected to each other by means of an invariable-ratio drive (18), which is meant to transform the continuous rotating motion of the countercutter drum (1) into a reciprocating rotating motion, with a predetermined frequency and annular width of the cutter drum (10), while the speed of rotation of the countercutter drum (1) is constrained by the sliding speed of the tape (15).

9. Apparatus as claimed in one or more of the preceding claims, characterized in that the cutter (10) and

countercutter drums (1) are supported so as to be extractable on drive shafts (3, 16), which are themselves supported at their ends (103, 116), on the free frontal side of the apparatus, the said supports being made of doors (8, 8') secured by removable means (9) to the framework (4, 104), that is to the front wall of the latter.

10. Apparatus as claimed in one or more of the preceding claims, characterized in that the countercutter and cutter drums (10, 1) and the shafts (3, 16) supporting them are provided of complementary means for automatic positioning.

11. Apparatus as claimed in claim 10, characterized in that the shafts (3, 16), supporting the cutter drum (10) and/or the countercutter drum (1) are shaped as trucated cones, tapering towards the front side of the apparatus provided with removable doors (8, 8'), while the drums (1, 10) themselves include truncated cone-shaped passing seats for the said shafts (3, 16).

12. Apparatus as claimed in one or more of the preceding claims, characterized in that the countercutter drum (1) is made to be suction-operating (201, 301) at least in the area substantially facing the cutter drum (10) and up to an area for the discharge of the slip (F), in which it is connected to atmospheric pressure or is blowing.

13. Apparatus as claimed in one or more of the preceding claims, characterized in that the cutters (11, 12) and/or the countercutters (5) are made to be adjustable as regards their axial and radial position, and are orientated with respect to each other and/or to the axes of rotation respectively, in such a manner as to perform a scissors cut through cutting edges (111, 112, 105).

14. Apparatus as claimed in one or more of the preceding claims, characterized in that the countercutter (5) and/or the cutters (11, 12) are supported to be radially elastically sprung.

15. Apparatus for making partial or complete cuts and incisions on tapes made of paper, plastic material, tinfoil or similar according to claim 1, characterised in that it is provided with independent means (20) for feeding or regulating the feeding speed of a tape (15), a first drum (1) and a second drum (10) rotatably mounted on parallel axis and driven by separate motors (M1, M2) and between which the tape (15) is fed, the first drum (1) carrying one cutter means (5) and the second drum (10) carrying at least two cutter means (11, 12) which co-operate with the cutter means (5) of the first drum (1) in order to make cuts (T1, T2), incisions, or the like in the tape (15), the first drum (1) being driven at a peripheral speed which can be regulated in an independent way relatively to the tape (15) feeding speed, and the second drum (10) being driven independently relatively to the first drum (1) and to the tape (15) and in an oscillating way, in any direction, in order to bring alternatively one of the at least two cutter means (11, 12) in an active position in which the said cutter means co-operate with the cutter means (5) of the first drum (1) or in an inactive position, in which none of the cutter means (11, 12) co-operate with the cutter means (5) of the first drum.

16. Apparatus according to claim 15, characterised in that the driving mean (20, M1, M2) are synchronised with one another by encoder means (21) surveying the driving speed and furnishing signals to a control unit (22).

17. Apparatus according to claims 15 or 16, characterised in that the control unit (22) regulates the ratio of peripheral speed of the first drum (1) relatively to the tape (15) feeding speed, and/or the direction and frequency of angular displacement of the second drum (10) in the different active and inactive positions, relatively to the tape (15) feeding speed and/or to the peripheral speed of the first drum (1).

18. Proceeding for making partial or complete cuts and incisions on tapes made of paper, plastic material, tinfoil or similar characterised in that it comprises the following steps:

- feeding a tape (15) with a prefixed adjustable speed between at least two co-operating cutting means (5, 11, 12);
- driving each of the at least two co-operating cutting means (5, 11, 12) on a circular path (1, 10);
- regulating the peripheral speed of at least one of the cutting means (5, 11, 12) on its circular path (1, 10) relatively to the tape (15) feeding speed and or relatively to the peripheral speed of the other cutting means (5, 11, 12) in such a way to change at least the ratio of peripheral speed of one of the cutting means (5, 11, 12) relatively to the tape (15) feeding speed, thus changing the distance between the single cuts (T11, T2) and the order of the cuts (T1, T2) made by the at least two different cutting means (11, 12) in the sequence of cuts.

19. Proceeding according to claim 18, characterised in that one of the cutting means (5) is driven on a close circular path (1), while the at least other cutting means (11, 12) is driven angularly displaceable between an active position in which it co-operates with the first cutting means (5) for cutting the tape (15) and an inactive position in which it does not co-operate with the said first cutting means (5).

20. Proceeding according to claim 18 or 19, characterised in that there is provided at least two different second cutting means (11, 12) angularly displaceable alternatively in an active position and in an inactive position, while a third position is provided in which both or all the second cutting means are inactive.

21. Proceeding according to claim 20, characterised in that the at least two second cutting means (11, 12) are mounted on the same supporting means (10) which are driven in an oscillating way alternatively between two different positions in which one of the at leas two cutting means (11, 12) is active and co-operates with the first cutting means (5) and a third position in which both the second cutting means (11, 12) are inactive, i. e. do not co-operate with the first cutting means (5), the frequency and the direction of angular displacement being variable.

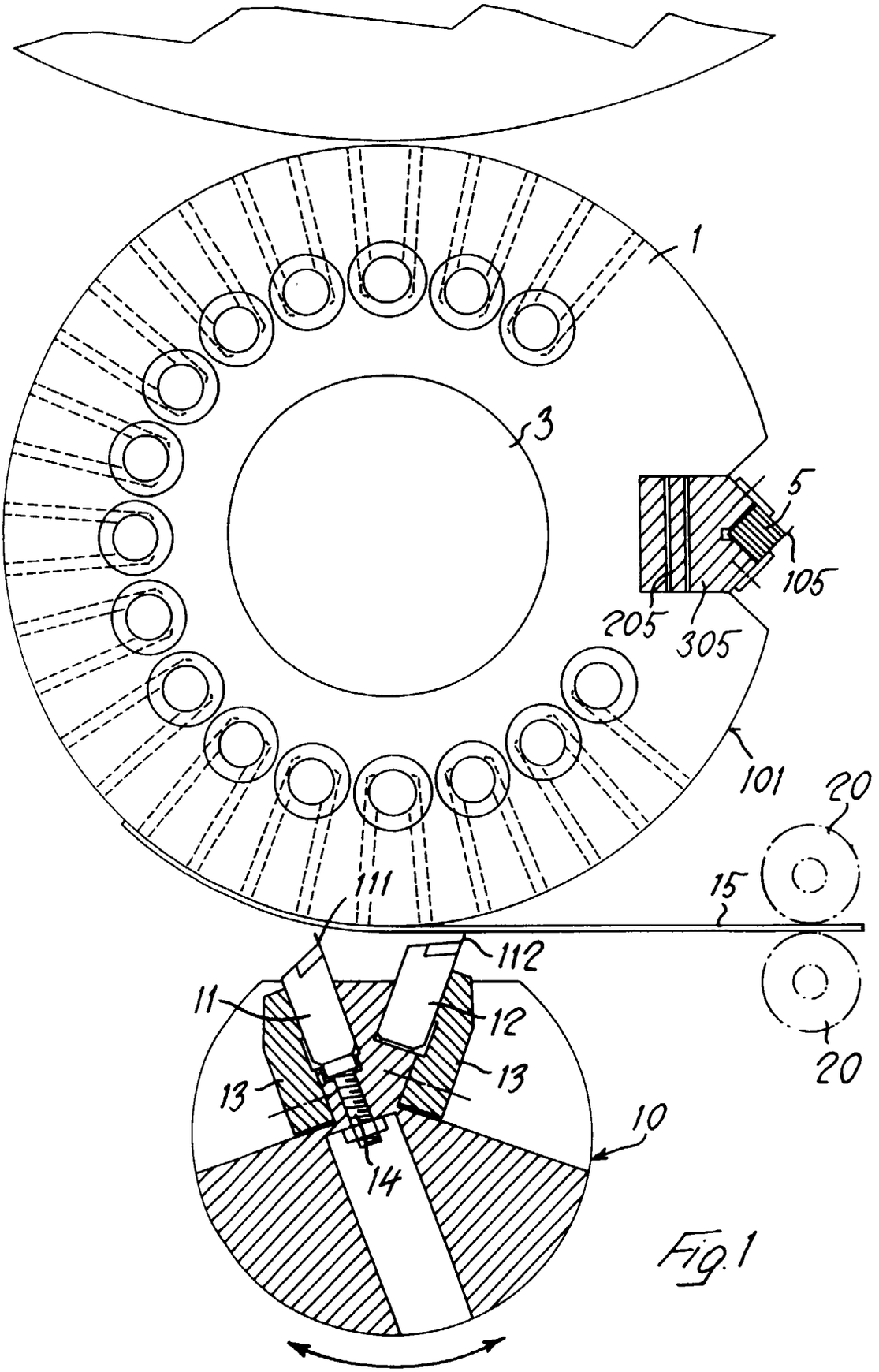

Fig.1

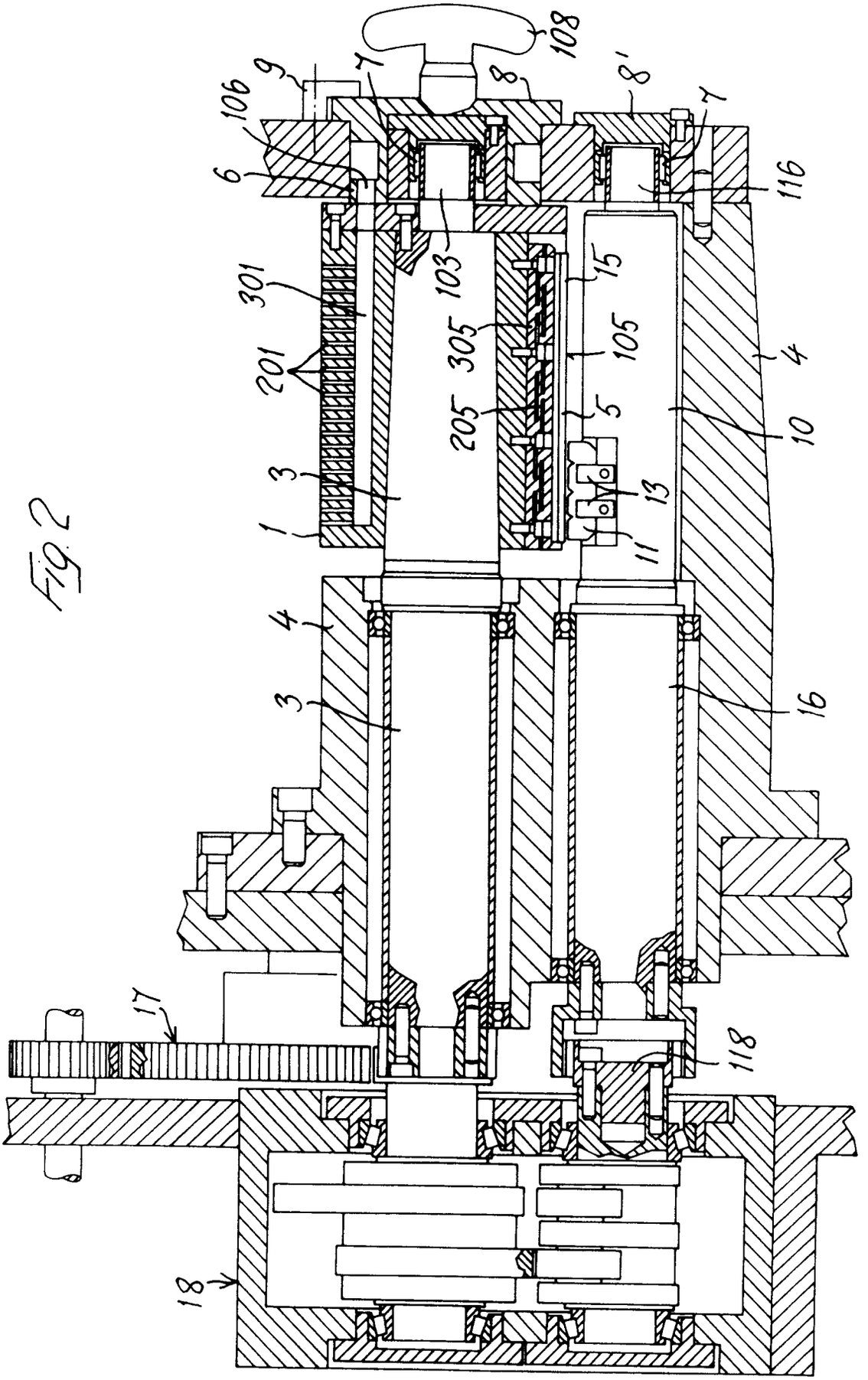
108
9
7
8
8'
7
106
6
116
103
15
301
305
105
4
201
205
5
10
3
13
1
11
4
3
16
17
118
18

Fig 2

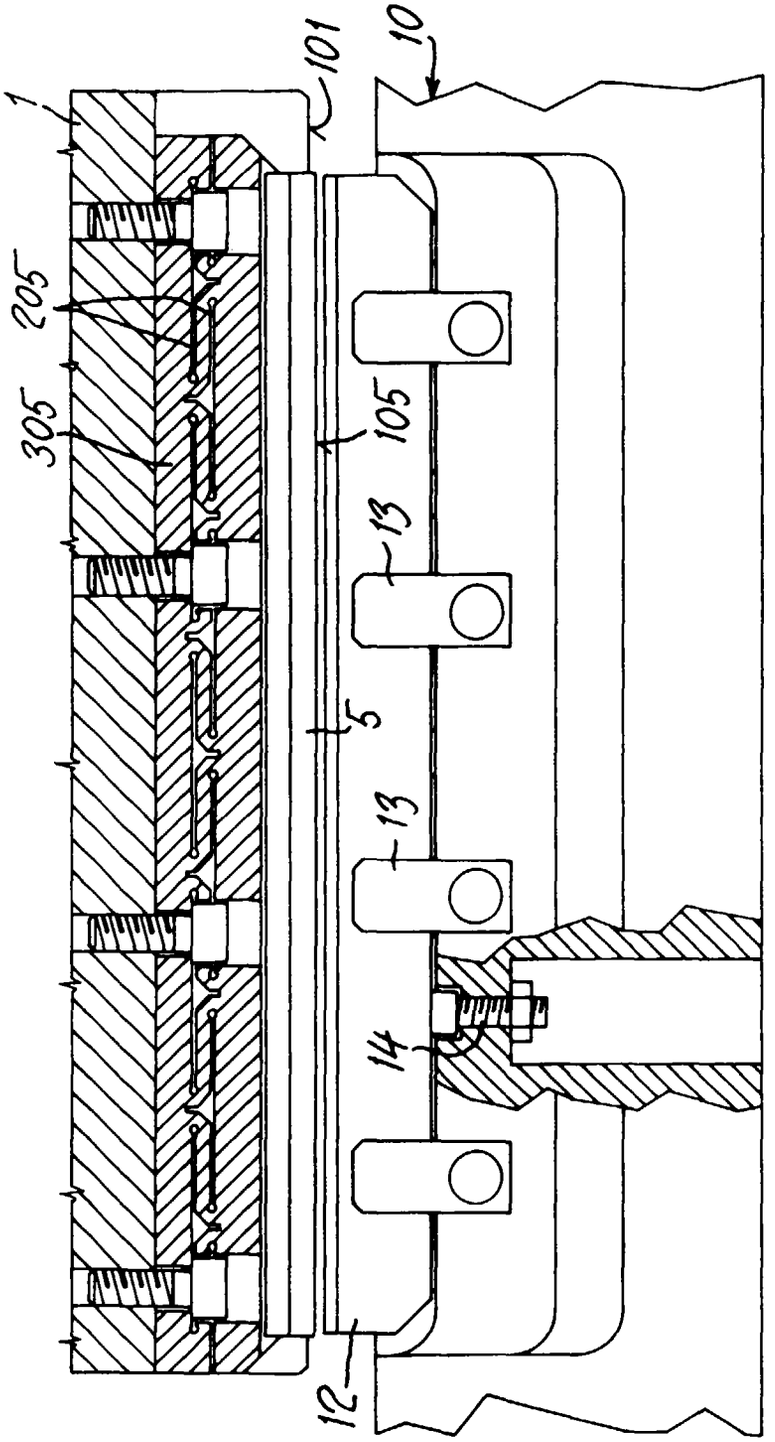

Fig. 3

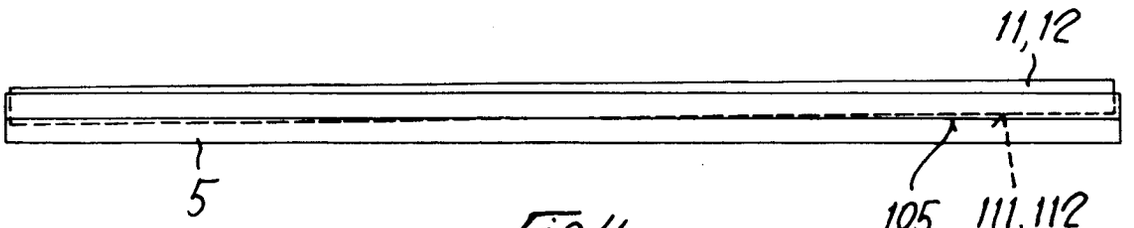

Fig. 4

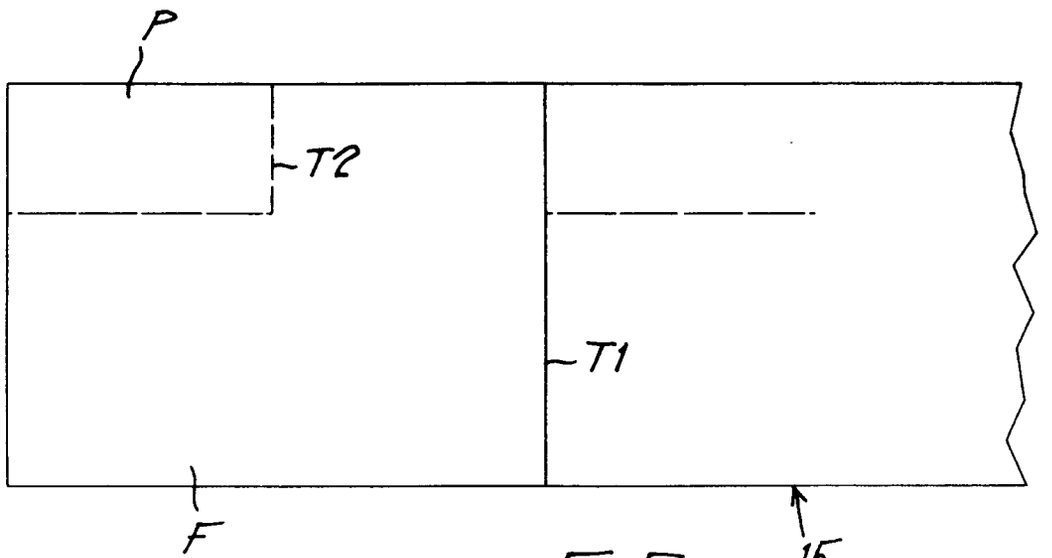

Fig. 5

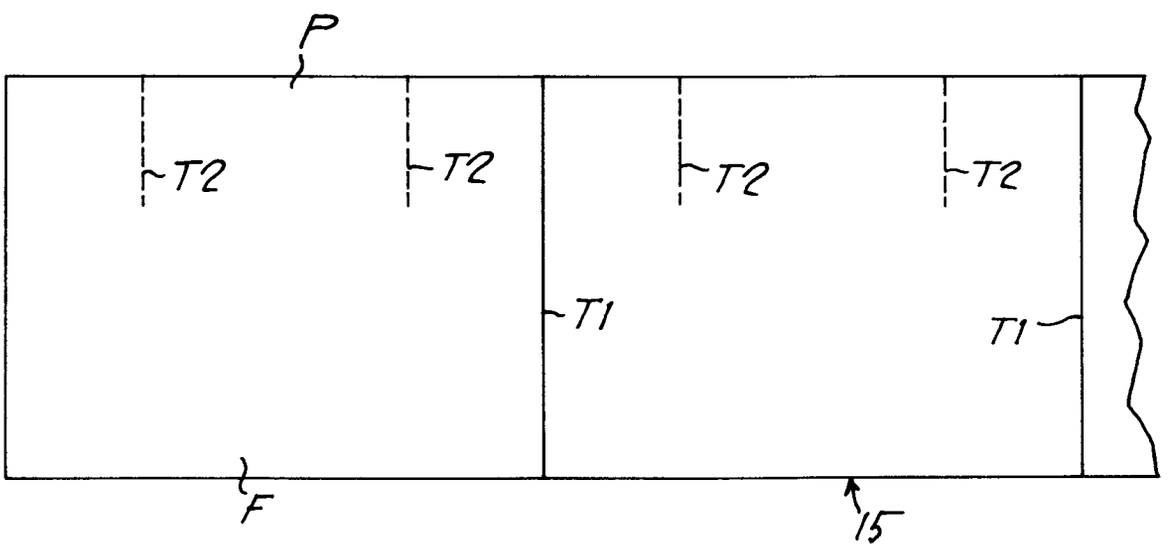

Fig. 7

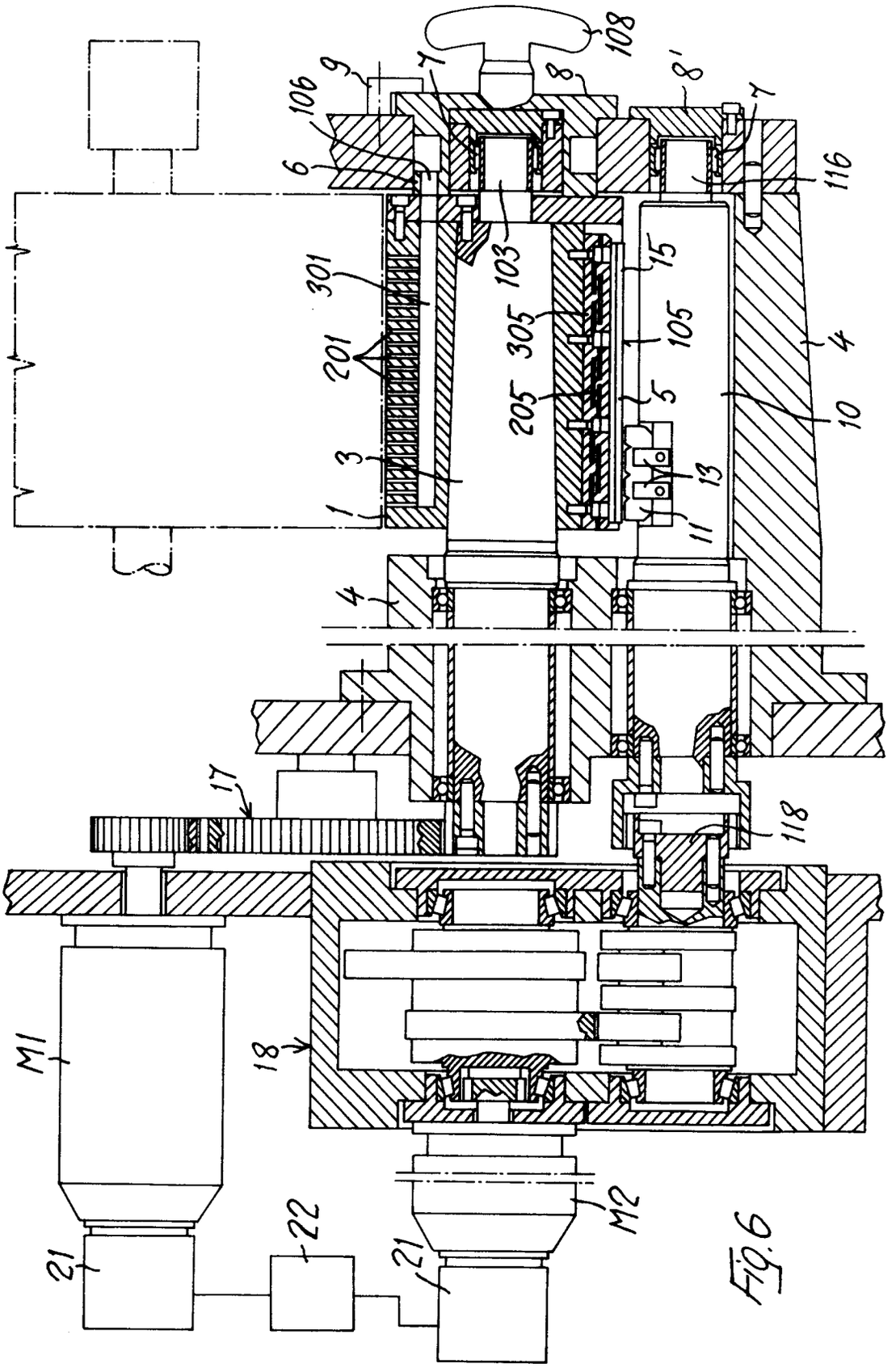
108
9
7
8
8'
7
106
6
116
103
15
301
305
105
4
201
205
5
10
3
13
1
11
4
17
118
M1
18
M2
21
22
21

Fig.6