

[54] MACHINE FOR PERFORMING
LONGITUDINAL AND TRANSVERSE
CUTTINGS IN SHEETS, PLATES AND
SIMILAR PRODUCTS

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[57] ABSTRACT

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The machine comprises a table 13 for supporting objects 3 comprised between a cardboard 4 and a plastic film 2. Blades 18 are provided on said table to perform longitudinal cuttings between the objects 3 and at the end of the table is placed a carriage 33 mobile on guides 30, said carriage comprising a tightening clamp 60 to drive the assembly made of the cardboard 4; the objects 3 and the film 2 according to direction of arrow f_1 . During the step by step return of the carriage 33, a blade supported by a second transverse carriage 70 performs the transverse cutting between the objects.

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53/282; 83/302

[51] Int. Cl. B65b 61/08; B65b 61/16

[58] Field of Search 53/178, 179, 182, 170,
53/177, 180, 389, 167, 112 A, 184 R, 282;
83/302

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16 Claims, 7 Drawing Figures

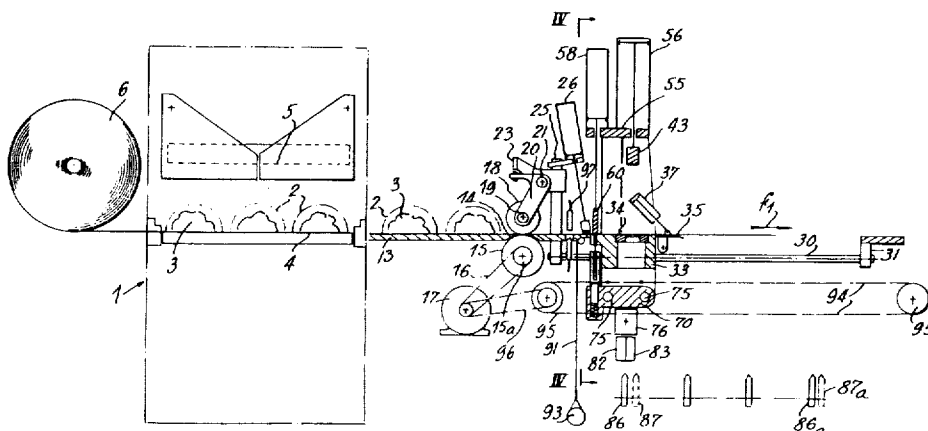
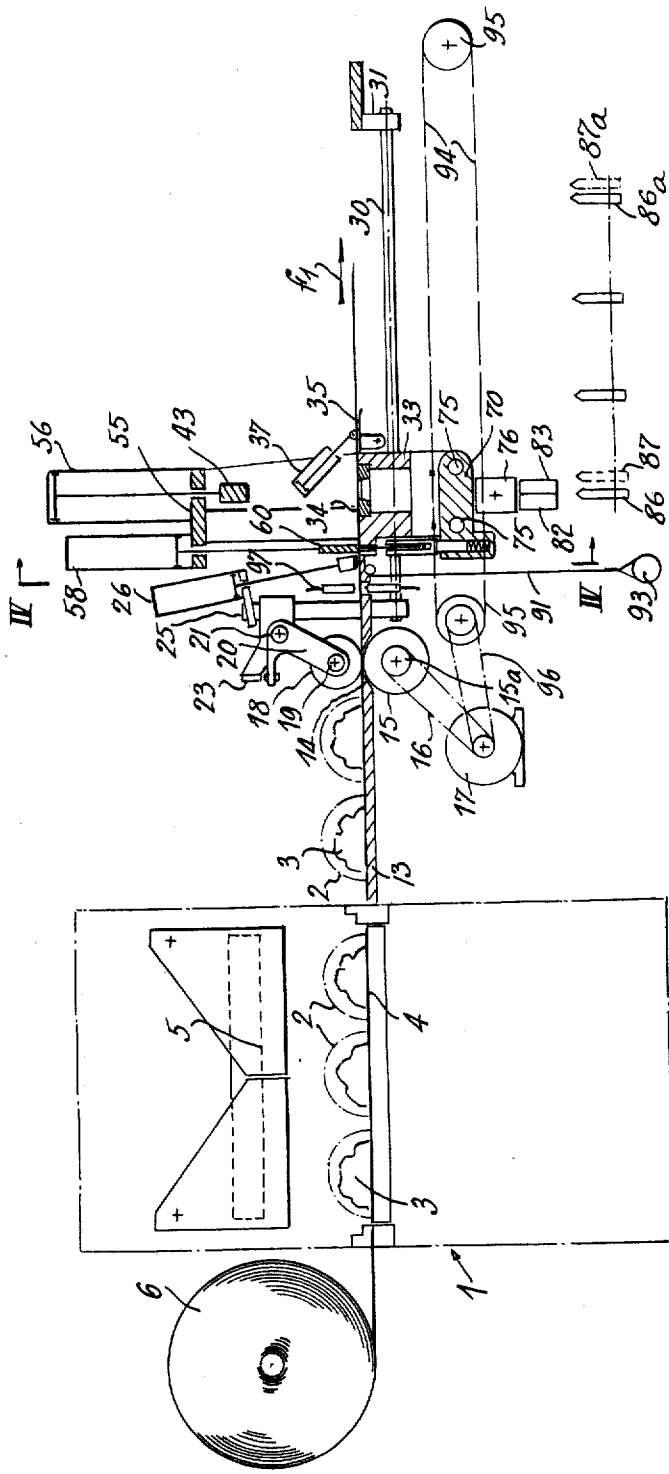


FIG. 1.



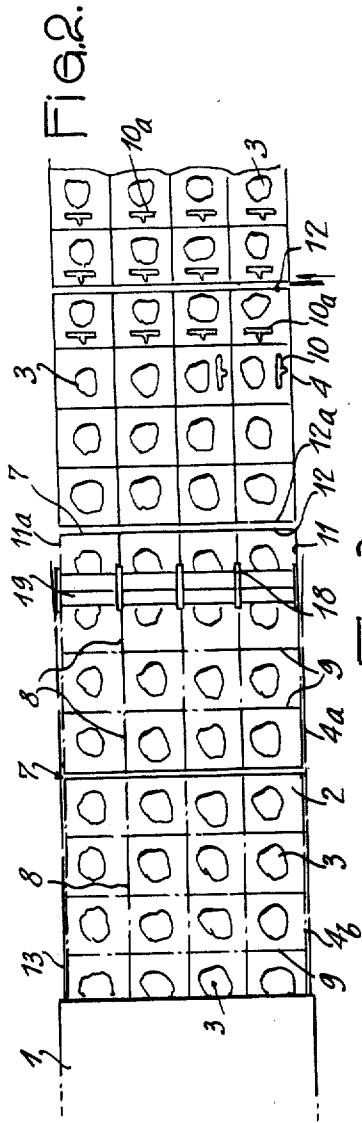


Fig. 2.

Fig. 3.

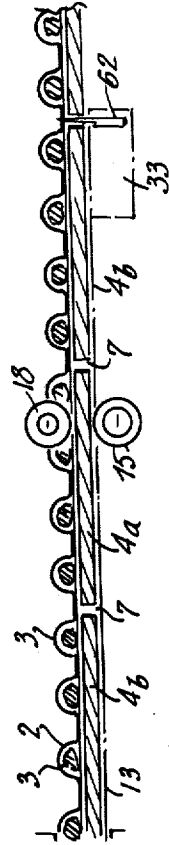


Fig. 6.

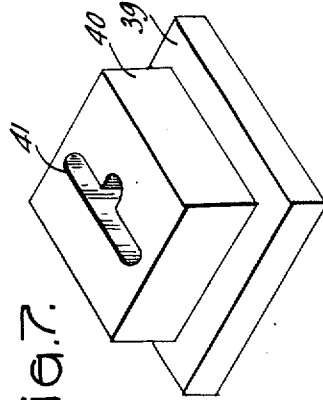
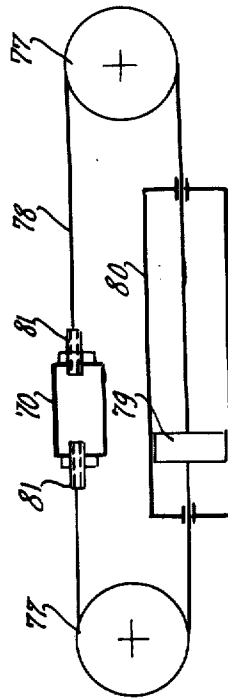


Fig. 7.

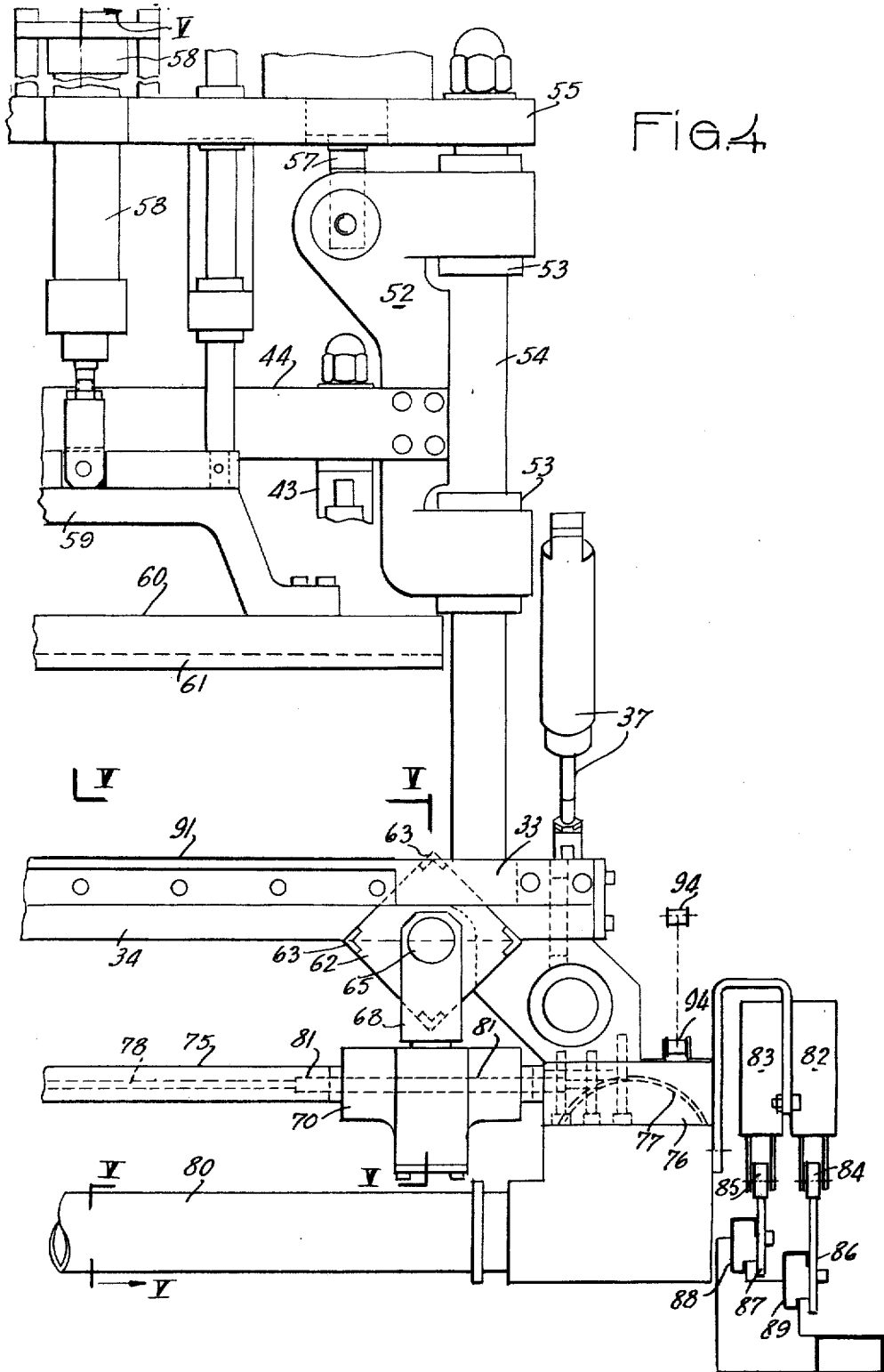
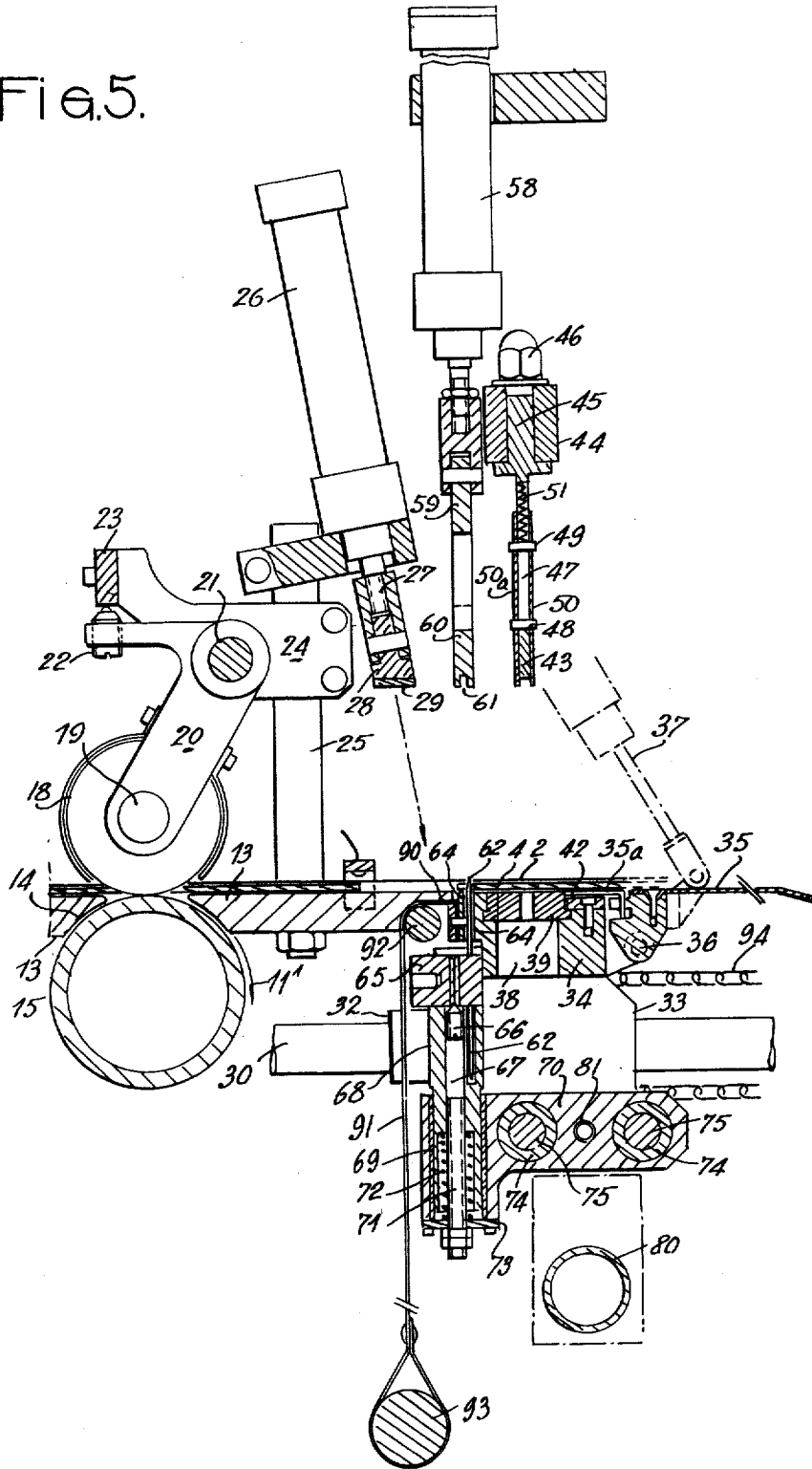


Fig. 5.



MACHINE FOR PERFORMING LONGITUDINAL AND TRANSVERSE CUTTINGS IN SHEETS, PLATES AND SIMILAR PRODUCTS

The invention relates to a machine for cutting, particularly into squares or rectangles, sheets, plates of composite elements, particularly pieces of cardboard supporting products covered with a plastics film.

Through the invention, the machine, which is the matter of it, makes possible the performance of cuttings, longitudinal as well as transverse, in very short times and without the necessity to design any intermediate transfer element between a forming machine and the cutting machine.

It is even possible, through the invention, to utilize the machine, which is the matter of it, in combination with a forming or packing machine of which it constitute the extractor.

Besides, through the invention, and particularly when the machine is utilized in combination with another forming or packing machine, the performance of the cuttings can easily be made during the normal working cycle of said forming or packing machine, thus the working rate of said machine is not reduced by the performance of said longitudinal and transverse cuttings.

According to the invention, the machine for performing longitudinal and transverse cuttings in sheets, plates and similar products is characterized in comprising a table for supporting the product to be cut, a set of blades placed fixedly in an arrangement transversal to said table, a first carriage placed at end of said table on longitudinal guides, said first carriage supporting at least one bar vertically mobile to press said product on top thereof, whereby advance of said first carriage causes advance of said product which is longitudinally cut by said blades, the first carriage further supporting a second carriage placed on guides extending angularly with respect to the guides of the first carriage and said second carriage supporting at least one blade protruding above said first carriage, whereby said blade ensures cutting of said product in transverse direction thereof during a step by step back cycle of said first carriage.

Various other characteristics of the invention are moreover shown in the following detailed description.

An embodiment of the invention is shown by way of no restrictive example, in the accompanying drawing in which.

FIG. 1 is a diagrammatic cross-sectional view of the cutting machine of the invention associated to a machine for vacuum packing.

FIG. 2 is an explanatory diagrammatic plan view.

FIG. 3 is a diagrammatic elevation view corresponding to FIG. 2.

FIG. 4 is an enlarged half sectional view taken substantially along line IV—IV of FIG. 1.

FIG. 5 is a partial sectional view substantially taken along line V—V of FIG. 4.

FIG. 6 is an explanatory diagram of a realization detail of a portion of the machine shown in FIG. 4.

FIG. 7 is a perspective view of a die shown in FIG. 5.

The left portion of FIG. 1 shows in a very diagrammatic way a machine generally referenced by 1, said machine being designed to ensure the plating under vacuum of a plastics film 2 around objects 3 placed on a sheet of cardboard 4 on which said objects 3 have been previously placed. The machine 1 also ensures

glueing of the plastics film 2 on the cardboard 4 by heating said film 2 by means of heating means 5 which are operated during a determined time ensuring a sufficient softening of said plastics film 2 to make it adhering to the cardboard 4.

The operation of the machine 1 is an intermittent operation since each cardboard 4, when covered with the film 2, must be immobilized to enable heating of said film 2 which is unrolled from a roll 6 to cover the cardboards 4 successively brought, together with their objects 3, under the heating means 5.

FIG. 2 shows that cardboards 4, 4a, 4b are separated by intervals 7 covered by the plastics film 2 and also shows that the objects 3 are placed on said cardboards according to longitudinal and transverse rows. Consequently, at output of the machine 1, longitudinal and transverse cuttings have to be made between the longitudinal rows, as shown in 8, and between the transverse rows, as shown in 9. Besides, in some cases, to provide hanging of the cut platelets, it can be necessary to form cuts 10 or 10a (FIG. 2), both in the cardboard and in the plastics film.

Still further and in order that the cut platelets, which are each provided with an object 3, will have perfectly clean edges, the lateral sides of the cardboards must be laterally cut as shown in 11 and 11a, and transversally cut at their ends, as shown in 12 and 12a, i.e., on each side of the intervals 7.

The machine 1 could be a machine different from the one shortly described in the above disclosure. For example, said machine could be constituted by a machine for forming under vacuum a sheet made of synthetic resin from which some objects would be constituted, for example pots for jam, yaourts and other products.

The cutting machine represented in the right portion of FIG. 1 enables the performance of the longitudinal cuttings 8 and transverse cuttings 9, and also the cuttings 11, 11a and 12, 12a as well as the formation of the cuts 10 or 10a during the working time of the machine 1, that is during the heating of the plastics film 2 or the forming of the plastics sheet and, besides, the machine of the invention makes possible the extraction of the product coming out from the machine 1.

According to the invention, the machine comprises a table 13 whereon the cardboards 4, objects 3 and the film 2, so assembled, are successively brought.

The table 13 has a transverse slot 14, in which is placed, to come flush substantially with the upper portion of said table 13, a cylinder 15, for example made of steel also shown in FIG. 5. Said cylinder is connected by a loose wheel 15a and a chain or a belt 16 to a motor-reducer brake 17.

The cylinder 15 is designed to cooperate with fixed blades formed by cutting disks 18 parallelly placed on a pin 19 supported by rocker-arms 20 pivotally mounted on a pin 21 and the bearing pressure of which can be adjusted by means of spring-studs 22 bearing on a fixed stop 23. The pin 21 is supported by an adjustable bracket 24 which is placed on vertical rods 25 connected to table 13, thus enabling an easy removal of the cutting disks when they are damaged.

The vertical rods 25 are also utilized for supporting a jack 26 having a rod 27 supporting a small bar 28 provided with a flexible lining 29 designed to bear, as shown in FIG. 1, on the top of the film 2 and possibly on the top of the portion of cardboard which is just at the end of said table 13, thus enabling, as described be-

low, to hold the cardboards 4 and 4a of FIG. 2 when the transversal cuttings of the cardboard 4 are performed.

FIG. 1 shows that vertical rods 25, which are placed on each side of the lateral sides of the table 13, support, at their lower ends, horizontal guides 30 (also visible in FIGS. 4 and 5) whose free end is fixed to a support 31. Said guides have advantageously the form of cylindrical bars on which are placed guiding liners, not shown in FIG. 1. One of said liners is shown and referenced 32 in FIG. 5, and they are a part of a carriage 33 which can thus be moved along the guides 30, i.e., under the cardboard 4.

On its top, the carriage 33 forms an entablature 34 whereon bears the cardboard 4, and said entablature 34 is extended by a swivelling plate 35 pivotally mounted on a pin 36 and which can be controlled by a jack 37. The entablature 34 delimits a transverse slot 38 for placing dies 39, said dies forming a core 40 of a square section, as shown in FIG. 7, which enables to place them in various positions for which their concavity 41 is lined up or, on the contrary, placed transversely with respect to the slot 38. The dies are held in place, as shown in FIG. 5, by a clamping bar 42 or other suitable element.

The dies 39 are designed to form the cuts 10 or 10a in FIG. 2 by cooperating with punches 43 (FIGS. 4 and 5) which are supported by a crosshead 44 extending above the transverse slot 38.

The punches 43 are supported by a cylindrical core 45 engaged into apertures designed in the crosshead 44, thus enabling an orientation of said punches according to the position occupied by the dies 39. When the angle that the punches have to make is determined, their core 45 is blocked by means of a nut 46. Each punch has an aperture 47 in which are passed guiding pins 48, 49 of two platelets 50, 50a.

A compression spring 51 tends to downwardly push the platelets 50, 50a which protrude beneath each punch, as shown in the drawing, thus at the moment when the punches are coming down, the platelets 50, 50a bear on the plastics film 2 pressing it against the cardboard. The punch being downwardly pushed then slides respectively to the platelets 50, 50a to ensure cutting of the film 2 and of the cardboard 4, as shown in 10 or 10a in FIG. 2, by cooperating with the die 39. When the punch comes up, the spring 51 holds the platelets bearing on the film 2 up to the moment when said punch is raised sufficiently up to prevent any wrenching of the cardboard 4 as well as of the film 2 which is cut.

The crosshead 44 supporting the punches 43 is placed on sliding guides 52 (FIG. 4) which are provided with sleeves 53 which can slide on columns 54 placed on the top of the carriage 33 on each side of the entablature 34.

The guiding columns 54 are connected at their upper portion by a connecting crosshead 55 forming a cross-beam on which are placed jacks 56, the rod 57 of which is coupled to each of the two sliding guides 52.

The connecting crosshead 55 also supports at least one jack 58, the piston rod of which is coupled to a support 59 of a small bar 60 extending transversely to the entablature 34. The small bar 60 has, as visible in FIG. 5, a groove 61 which is situated just above the cutting edge of a blade 62 protruding from entablature 34.

FIG. 4 shows that it is advantageous that the blade 62 be made in the shape of a polygonal blade, for example

a square blade with angles 63 forming cutting edges. Thus, when a cutting edge is damaged, just the blade has to be turned to bring another cutting edge in a working position.

The blade 62 is passed, as shown in FIG. 5, through a transverse slot 64 of the entablature 34 and said blade is supported by a pin 65 held by a spring-stud 66 screwed in a screwing 67 of a slide 68.

The slide 68 is vertically guided into a boring 69 of a second carriage 70. A threaded rod 71 is also screwed in the screwing 67 of the slide 68, and a spring 72 is placed around said threaded rod to bear against said slide and against a stop-plate 73. It is thus easy to adjust the position of the slide 68 in relation with the second carriage 70 and, consequently, the importance of the protruberance of the cutting edge of blade 62.

The second carriage 70 is guided through rings 74 on two rods 75 extending transversely with respect to the entablature 34 and consequently at right angle with respect to the guides 30 guiding the first carriage 33. The rods 75 are supported at their ends in supports 76 (FIG. 4) carried by the carriage 33. The supports 76 are also utilized for holding pulleys 77 (FIGS. 4 and 6) on which a cable 78 is stretched, said cable forming a loop to connect the piston 79 of a jack 80 to tips 81 screwed in the second carriage 70.

One of the supports 76 also carries contactors 82, 83 (FIG. 4). These contactors are provided with rollers 84, 85 placed on the travel of sets of cams 86 and 87 supported by sections 88, 89 fixedly placed in relation with the carriage 33. The connection between the cams 86, 87 and the sections 88, 89 is made so that said cams be adjustable in any desired way.

The entablature 34 of the first carriage 33 also supports the end 90 (FIG. 5) of a flexible band 91 guided on a roll 92 supported by the table 13. A counterweight 93 is designed at the end of the band 91 to keep it well stretched.

The driving along the guides 30 of the carriage 33 is ensured, as shown in FIG. 1, by endless chains 94 placed on each side of said carriage on sprocket-wheels 95. One of said sprocket-wheels is, besides, connected to the motor-reducer brake 17 by a chain or a belt 96.

Besides the above described components, the machine comprises, as shows in FIG. 5, at a short distance of the end of the table 13, a detector 97, for example a photo-electric cell, which detects the end of a cardboard 4, in the example shown, the end of the cardboard 4a.

The above described machine works in the following way:

When the machine 1 has completed its working cycle, an information is given, which causes to control the operation of the jack 58. The bar 60 is thus applied against the rear portion of the cardboard 4, assuming that said cardboard has been advanced upon a previous cycle. AS soon as this first operation has been performed, the motor-reducer brake 17 is operated, and it drives both the chains 94 and the bearing cylinder 15.

The chains 94, which are connected to the first carriage 33, move said first carriage in direction of the arrow f_1 (FIG. 1). This motion continues up to the moment when the cell 97 detects the front end of a next cardboard, as shown in FIG. 5. At that moment, the motor-reducer brake 17 is stopped and the carriage 33 has advanced of an interval corresponding to the length of a cardboard 4. During said advance motion, a new

length of plastics film, or a new length of plastics sheet has been brought in the machine 1 which is, consequently, ready to perform a new working cycle. Said advance motion has also caused the motion of the cardboard covered with a plastics film, previously extracted from the machine 1, in front of the cutting disks 18 which, since they are bearing on cylinder 15, have performed the longitudinal cuttings 8 and 11, 11a of FIG. 2, in the cardboard 4a. The falls of the lateral edges 11, are separated by making them pass in the slot 14 of the table 13 through which they are driven by the cylinder 15 as shown in FIG. 5. The longitudinal cuttings 8 and 11, 11a have been performed in the cardboard 4 upon the previous cycle.

The detection by the cell 97 of the end of the cardboard 4a, has also for its result to control the jack 26, so that the flexible lining 29 of the bar 28, that the same controls, presses the plastics film 2 on the end of the table 13. This pressing step being advantageously made in the interval 7 separating the cardboard 4 from the cardboard 4a, the immobilization of both the cardboard 4 and of the cardboard 4a is provided since the jack 26 performs a crimping between them.

The end of the stroke of jack 26, or another signal, can be utilized to control again the motor-reducer brake 17, but in a way opposite to the one previously taken into consideration, thus the carriage 33 slides again along the guides 30 but in the opposite direction of the one shown by the arrow f_1 .

Then the contactor 83 meets a first cam 87, as the one designated by 87a in FIG. 1, the motor-reducer brake 17 is stopped and the jack 80 is fed, thus causing the driving, through the cable 78, of the second carriage 80 which is guided along the rods 75 transversely of the entablature 34.

The motion of the second carriage 70 causes the driving of the blade 62 and, consequently, a first transverse cutting 12 is performed, at the end of which the motor-reducer brake 17 is again fed to move again the first carriage 33 until its contactor 82 meets with a cam 86, for example the cam 86a. At that moment, the carriage 33 is again immobilized and the jacks 56 are fed to make the punches 43 come down to perform the cuts 10a, the coming up of said punches causing a new start of the motor-reducer brake 17, thus a new translation of the carriage 33 which is afterwards stopped when meeting with a new cam 87. At that moment, the jack 80 controlling the second carriage 70 is fed again, but in the other direction to return the blade 62 back to its original position, thus ensuring performance of a transverse cutting 9, but by the second cutting edge 63 of the blade 62.

Before each translation move of the first carriage 33, the jack 58 is fed to lift the bar 60 and this jack is also fed, but in the other direction, at each stop of said carriage 33, thus the bar 60 presses the cardboard covered with a plastics film before the move of the blade 62.

The above described operations are then repeated until performance of all the transverse cuttings 9 and performance of the final transverse cutting 12a.

After each cutting performance, the jack 37 is fed, thus the table 35 swivels around the pin 36 while making clamps 35a to raise, said clamps extending the pin towards the rear portion and extending up to between the dies 39 (FIG. 5). Thus, the cut platelets or objects are ejected to be recuperated, for example into a spout.

The initial advance of the first carriage 33 in direction of the arrow f_1 drives the band 91, thus said band is held stretched by its counterweight 93 beneath cardboard 4 which is thus well supported preventing it to get excessively bent. On the other hand, during the different moves of the first carriage 33 on its way back, the cardboard 4 is held immobilized by the bar of the jack 26 since the lining 29 of said bar tightens the plastics film just at the rear end of said cardboard 4.

The various operations as above described can be performed in a very short time, and the total duration of the operating step by step cycles of the described machine can, in practically all cases, be smaller than the duration of the operating cycle of the forming machine 1, thus the cuts performed do not increase the working times and, in principal, do not slow down the normal working rate of the machine 1.

The invention is not restricted to the embodiment shown and described in detail, for various modifications can moreover be applied thereto without departing from the scope of the present invention as shown in the appended claims. Especially, the second carriage 70 can be placed, if desired, on guides not forming a right angle with the guides of the first carriage 33, which provides to perform oblique cuttings. Also the punching device 43 may not be utilized when the cuts 10, 10a are not required. On the other hand, it is understood that the control of the different moves can be realized in many various ways, for example by elaborating an information at the end of the stroke of some of the described mobile elements, or also by utilizing memory circuits, the realizations of which can be extremely numerous and are well known in the art. The chains 94, cables 78 and belt 16, 96 can also be replaced by jacks, linear motors or other components.

I claim:

1. Packaging and cutting apparatus comprising a packaging unit for packaging a plurality of objects between a supporting sheet and a covering film bonded to said sheet, a table located near said packaging unit to support said sheet and film to be cut between said objects, a set of blades fixedly placed in an arrangement transverse to said table, a first carriage placed at end of said table on longitudinal guides, said first carriage supporting at least one small bar vertically mobile to press said sheet and film on top thereof, whereby advance of said first carriage causes advance of said sheet and film which are longitudinally cut by said blades, the first carriage further supporting a second carriage placed on guides extending angularly to the guides on which the first carriage is moved, and said second carriage supporting at least one blade protruding above said first carriage, whereby said blade ensures cutting of said sheet and film in transversal direction thereof during a step by step action cycle of said first carriage.

2. Apparatus as set forth in claim 1, wherein said first carriage further supports a set of dies placed beneath the sheet and film covering it, and a set of vertically mobile punches to cooperate with said dies whereby causing formation of cuts in said sheet and film.

3. Apparatus as set forth in claim 1, wherein the small bar pressing the sheet and film transversely on the first carriage has a longitudinal groove lined up with the cutting edge of the blade driven by the second carriage.

4. Apparatus as set forth in claim 1 comprising a crimping jack supported by a fixed frame and having a mobile rod carrying a crimping bar bearing on rear por-

tion of the sheet, film and objects advanced by the carriage at end of its advance stroke, whereby said advanced sheet is prevented to return back during the step by step return cycle of the first carriage.

5. Apparatus as set forth in claim 1, wherein the set of blades fixedly placed with respect to the table and transversely thereto comprises a set of cutting disks placed in parallel to each other on a common pin supported by a device with a lever connected to a component for pressing said disks on the periphery of a bearing cylinder placed beneath said table and protruding, up to upper level thereof, through an aperture provided in the table, said bearing cylinder being connected to a driving motor, whereby it cooperates to the driving of the sheet and film for performance of longitudinal cutting thereof during driving by the first carriage.

6. Apparatus as set forth in claim 1, comprising a common cross-beam supported by the first carriage, said cross-beam supporting control jacks for controlling motion of the small bar applying the sheet, film and objects on said first carriage and supporting punches cooperating with dies also supported by said carriage.

7. Apparatus as set forth in claim 6, wherein the punches are removably placed on a common bar fixed to guides sliding along columns constituting mounting elements for the cross-beam, whereby said punches can be changed over and are adjustable both in position and angularly.

8. Apparatus as set forth in claim 2, wherein the dies cooperating with the punches are formed into cores having a polygonal section and placed in grooves delimited by an entablature of the first carriage, whereby said dies are adjustable both in position and angularly.

9. Apparatus as set forth in claim 1, comprising a swivelling table placed at end of an entablature of the first carriage, said table being coupled to a jack controlling swivelling thereof for ejecting cut portions of sheet and film after performance of each transverse cutting.

10. Apparatus as set forth in claim 5, wherein the first carriage is driven along longitudinal guides by endless chains trained around sprocket wheels, one of said wheels being driven by a motor-reducer brake, said motor-reducer brake simultaneously driving the bearing cylinder of the blades performing the longitudinal cuttings through a free wheel, whereby said cylinder is no longer driven when said motor-reducer brake causes the step by step return of said first carriage.

11. Apparatus as set forth in claim 1, wherein the second carriage supporting the blades performing the

transverse cuttings is moved along its guides by a cable rolled up on pulleys and connected to a double-effect jack, whereby said blades perform a first transverse cutting during a going on stroke of the jack and a second transverse cutting during a return stroke of said jack.

12. Apparatus as set forth in claim 1, comprising a band rolled on a guiding cylinder supported by the table and placed at the end of the first carriage, whereby said band is unrolled as said first carriage advances to support the sheet and film driven by said carriage.

13. Apparatus as set forth in claim 2, wherein a set of adjustable cams is placed fixedly beneath the first carriage, and a set of switches is supported by said carriage to control the step by step return of said first carriage and the successive operating cycles of the blade supported by said second carriage as well as the cuttings performed by the punches cooperating with the dies supported by the first carriage.

14. Apparatus as set forth in claim 1, wherein two cutting disks are placed near the edges of the sheet and film to cut two lateral falls thereof and wherein the bearing cylinder of said cutting disks form a driving and ejecting element for the falls thus formed.

15. Apparatus as set forth in claim 1 comprising a plastic film unrolled from a roll, cardboard sheets and film coming from a packaging unit and moved by the first carriage, whereby extraction from the packaging unit corresponds to end of an operating cycle of said packaging unit, and the performance of the transverse cuttings is then made during a next cycle of operation of said packaging unit.

16. Apparatus as set forth in claim 15, comprising a crimping jack supported by a fixed frame and having a mobile rod carrying a crimping bar, said crimping bar bearing on rear portion of the cardboard sheets advanced by the carriage at the end of its advance stroke and further comprising a cell detecting the end of successive cardboard sheets, said cell controlling stoppage of the advance of the first carriage as well as the control of the crimping jack of which the bearing bar is inserted into an interval separating two successive cardboard sheets while forming a no-return stop for the cardboard sheet which has been the more advanced by said first carriage and on which the transverse cuttings are performed during the step to step return course of said first carriage.

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