Sept. 27, 1966 A. SCHMERMUND 3,274,870

MEANS FOR CUTTING A WEB TO PRODUCE OVERLAPPED SHEETS

Filed June 4, 1963 4 Sheets-Sheet 1

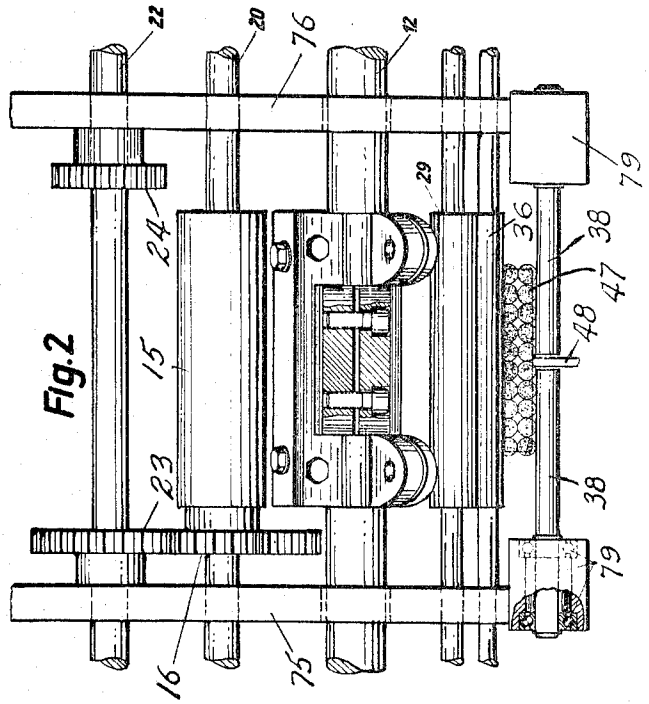


Fig.2

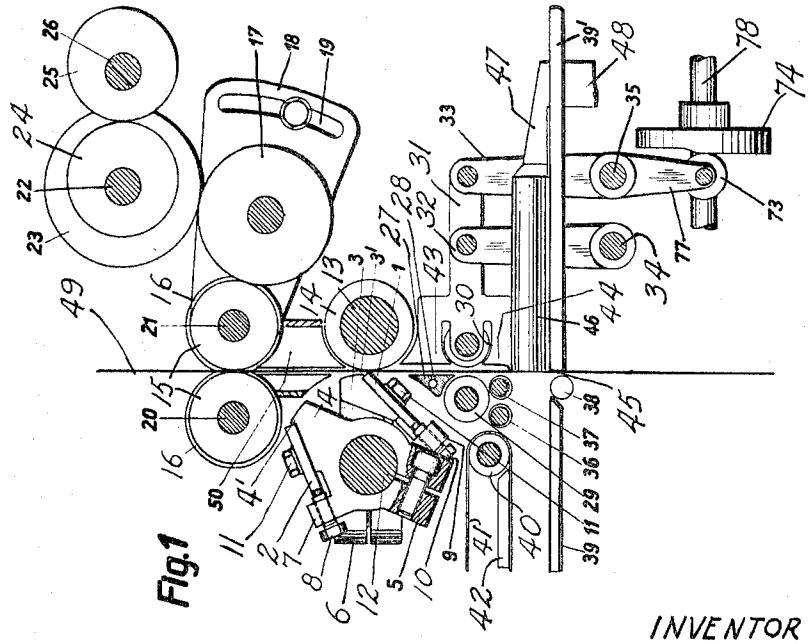


Fig.1

INVENTOR
ALFRED SCHMERMUND
BY Nolte & Nolte
ATTORNEYS

Sept. 27, 1966 A. SCHMERMUND 3,274,870

MEANS FOR CUTTING A WEB TO PRODUCE OVERLAPPED SHEETS

Filed June 4, 1963 4 Sheets-Sheet 2

Fig. 3

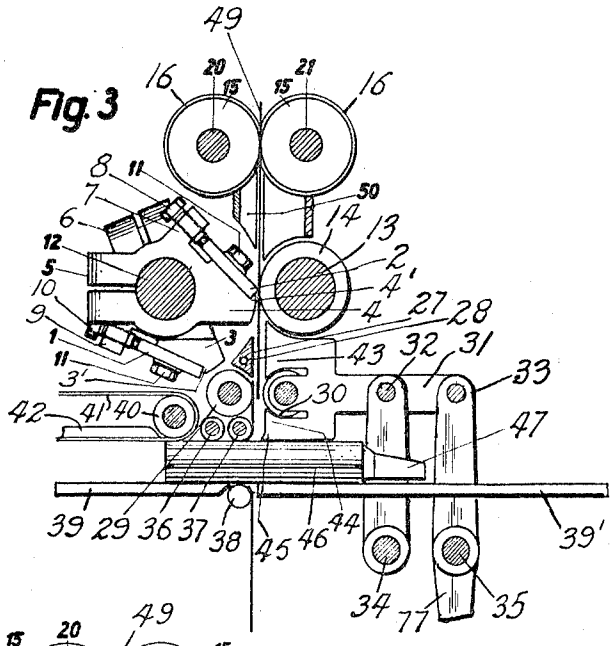
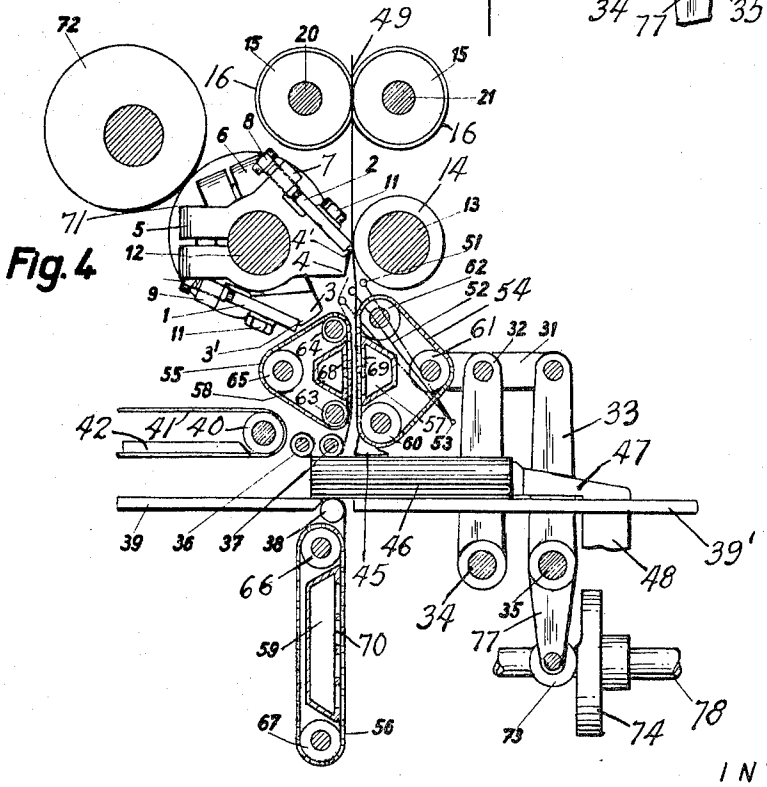


Fig. 4



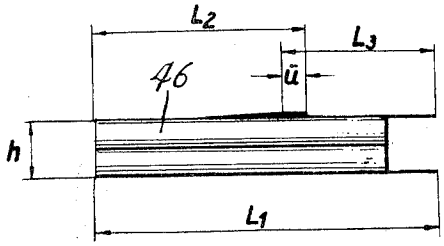
INVENTOR
ALFRED SCHMERMUND
BY: Holte & Holte
ATTORNEYS

Sept. 27, 1966 A. SCHMERMUND 3,274,870

MEANS FOR CUTTING A WEB TO PRODUCE OVERLAPPED SHEETS

Filed June 4, 1963 4 Sheets-Sheet 3

Fig.5



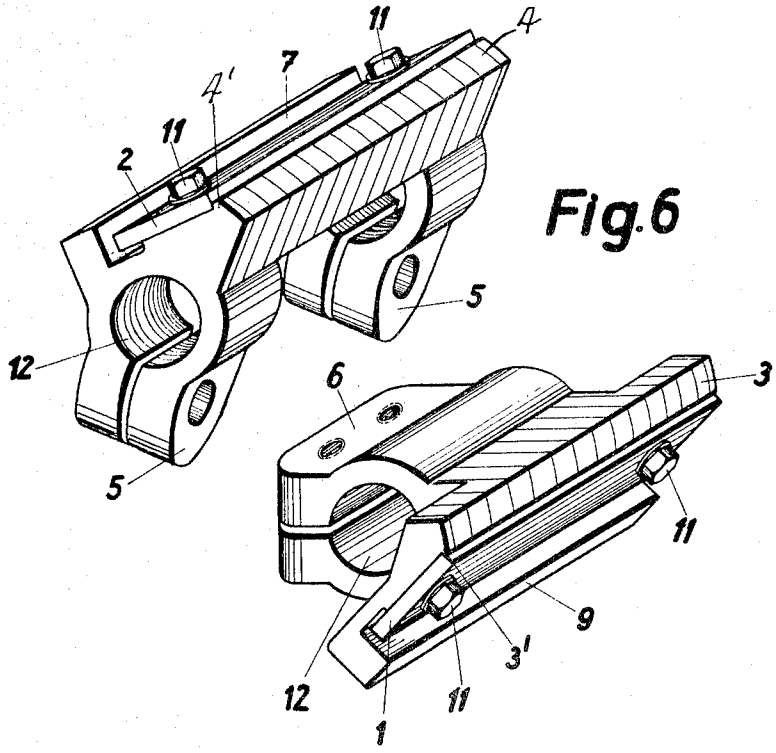


Fig.6

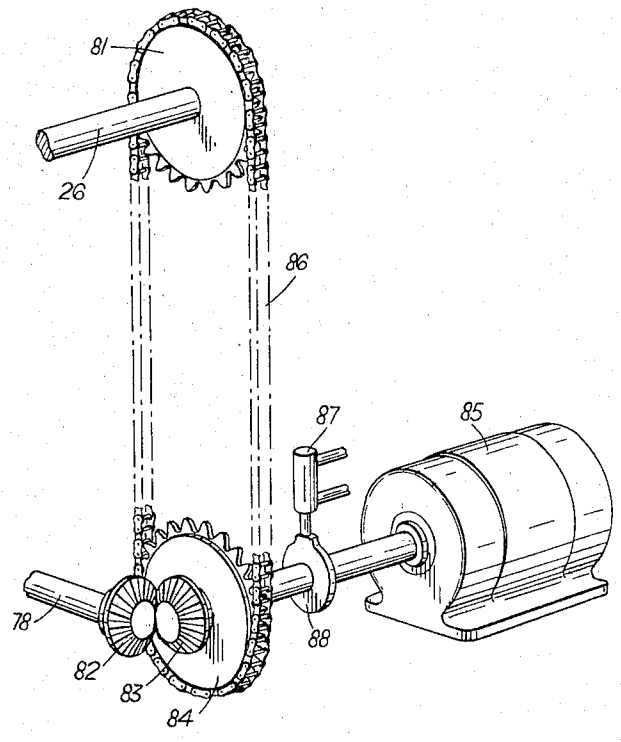
INVENTOR:
ALFRED SCHMERMUND
BY: Nolte & Nolte
ATTORNEYS

Sept. 27, 1966 A. SCHMERMUND 3,274,870

MEANS FOR CUTTING A WEB TO PRODUCE OVERLAPPED SHEETS

Filed June 4, 1963 4 Sheets-Sheet 4

Fig. 7.



Inventor
ALFRED SCHMERMUND
By: Nolte & Nolte
Attorneys

United States Patent Office 3,274,870 Patented Sept. 27, 1966

3,274,870

MEANS FOR CUTTING A WEB TO PRODUCE OVERLAPPED SHEETS

Alfred Schmermund, 60 Kornerstrasse, Gevelsberg, Westphalia, Germany

Filed June 4, 1963, Ser. No. 285,352
Claims priority, application Germany, June 8, 1962, Sch 31,596
8 Claims. (Cl. 83—88)

The invention relates to packing machines, and more especially to arrangements for feeding separate portions of wrapping material, which overlap each other, to a wrapping station.

Arrangements have been proposed, in which two separate portions of wrapping material are drawn from two separate rolls of material. This has been found to be disadvantageous since, for example when packing cigarettes in two individually wrapped blocks of ten cigarettes each, in a slide and shell type packet and if the packing machine has two working paths, four blocks of ten cigarettes have to be wrapped and thus eight separate rolls of wrapping material are needed. It is structurally difficult to provide a machine having eight separate rolls of wrapping material and the necessary feeding means therefor.

Moreover, it is desirable to provide reserve rolls of wrapping material so that when a given roll is exhausted, a reserve roll positioned nearby can be brought into use by securing the free end of the wrapping material of the reserve roll onto the trailing end of the material drawn from the roll just exhausted. This reduces the amount of idle time, since the exhausted rolls can be replaced while the reserve rolls are being used, but the number of rolls present is doubled, so that in a machine having two working paths each packing two blocks of ten cigarettes, sixteen rolls of wrapping material and holders therefor would be necessary.

An arrangement has been proposed for cutting separate portions of wrapping material, one longer than the other, from a single roll; but in this case, the longer portion of the wrapping material is just drawn vertically from the roll and cut by a rotating cutter which moves in a first horizontal path. Material then drawn from the roll is accelerated until its leading end overlaps the trailing end of the longer portion and the shorter portion is cut from the roll by a second rotating cutter which moves in a second horizontal path. Rotating cutters of this kind can only be used in machines having a plurality of packing paths if the cutters are arranged in different transverse planes relative to the packing paths, since otherwise the cutters of one packing path would interfere with the cutters of other packing paths. This means that the packing paths become unduly long.

It is an object of the invention to provide an arrangement for cutting and feeding separate portions of wrapping material to a wrapping station, which arrangement is compatible for use in multi-path packing machines without requiring any undue increase in length of the packing paths.

It is another object of the invention to provide an arrangement for cutting and feeding separate portions of wrapping material to a wrapping station, which makes use of a rotating cutter which is so arranged that it performs two successive cuts.

These and other objects and advantages of the invention will become clear from the following description when read with reference to the accompanying drawings, which are given by way of example and in which:

FIG. 1 is an end elevation view, partly in section of a cutting and feeding arrangement;

FIG. 2 is a side view of the arrangement of FIG. 1;

FIG. 3 is a view, similar to FIG. 1, but with several parts omitted, showing the arrangement in a different operative position;

FIG. 4 is a view, similar to FIG. 3, of a modified cutting and feeding arrangement;

FIG. 5 illustrates a block of cigarettes and shows the disposition of wrapping material portions therearound;

FIG. 6 is a perspective view showing two cutter members which together make up a cutter; and

FIG. 7 is a perspective view showing a drive arrangement.

The arrangement of FIGS. 1, 2, 3 and 6 comprises a cutter formed by two cutter holders 3 and 4 which are secured by bolts and clamping lugs 5 and 6 onto a shaft 12. The cutter holders 3 and 4 carry cutter blades 1 and 2 which are secured thereon by means of screws 11. The cutter holders 3 and 4 have lugs 9 and 7 respectively, through which set-screws 10 and 8 extend, the set-screws pressing the cutter blades 1 and 2 into abutting engagement with stops 3' and 4' provided on the cutter holders, thus ensuring the correct radial position of the cutter blades.

The cutter roller is positioned for cooperating with a smooth cylindrical counter cutter roller 14 which is mounted on a shaft 13. Guides 50 are provided for guiding a web 49 of metal foil to the bight of the cutter and the counter roller, and above the guides 50 two cooperating feeding rollers 15 are provided which feed the web 49 into the guides 50 and thence to the cooperating cutter and counter roller.

The feeding rollers 15 are mounted on shafts 20 and 21 and are secured to spur wheels 16 which mesh with each other. The spur wheel 16 of the roller 15 which is mounted on the shaft 21 is engaged by spur wheel 17 which is arranged on a rocker 18 movable about the shaft 21 and lockable in a desired position by a bolt engaging a slot 19. The spur wheel 17 is driven by a change wheel 23, hence the necessity for adjustment of the position of the rocker 18, the change wheel 23 being fixedly connected to an eccentrically mounted spur wheel 24 by means of a common shaft 22. The spur wheel 24 is driven by an eccentrically mounted spur wheel 25 mounted on a shaft 26 driven by a chain wheel 81 (see FIG. 7). It will be appreciated that the length of web 49 fed by the rollers 15 depends on the size of the change wheel 23 and that the eccentrically mounted spur wheels 24 and 25 ensure that the speed with which the web is fed is greater at a given instant than at another instant.

Adjacent to the path of feed of the web 49 and below the cooperating cutter and counter roller, a suction block 27 having suction openings 28 is provided, and immediately therebelow a transport roller 29. The suction block 27 is connected to a suction valve 87 (see FIG. 7) which is opened at a predetermined time by the action thereon of a cam 88, driven by a motor 85. At the opposite side of the web to the transport roller 29, a transport roller 30 is provided which is mounted in a holder 31 pivotally attached to levers 32 and 33 which are pivoted on shafts 34 and 35 in such manner that the roller 30 can perform a movement towards and away from the roller 29. The lever 33 has an arm 77 extending beyond the shaft 35, the arm 77 carrying a sensing roller 73 which is engaged by a face cam 74 mounted on a drive shaft 78. The drive shaft 78 is driven by a bevel wheel 82 (see FIG. 7) which meshes with a bevel wheel 83 carried by a chain wheel 84. The chain wheel 84 is driven by the motor 85 and is linked with the chain wheel 81 by a chain 85, so that the drive shaft 78 is driven in timed relation with the drive shaft 26, and thus causes the roller

30 to be brought into close proximity with the roller 29 for a predetermined time and then separated therefrom.

The holder 31 has guide cheeks 43 and 44, the cheek 44 having a projection 45 for pressing on the web 49 so as to deviate the web out of its path shown in FIG. 1.

Below the transport roller 29, two further transport rollers 36 and 37 are provided, these being at a common peripheral level with an endless belt 41 which passes over a guide roller 40 and below a guide plate 42. A cigarette block 46, composed of two layers of cigarettes, is shown in FIG. 1 in engagement with the web 49 at one side thereof. At the other side of the web 49 and spaced below the belt 41 by the height of the cigarette block 46 is a guide plate 39, this being a continuation of a guide plate 39' on which the cigarette block 46 is moved up to the web 49. Pushing dogs 47 operable in known manner, for example by an endless chain drive (not shown) are provided for feeding the cigarette blocks along the guide plate 39', an arm 48 of each pushing dog 47 being movable in a longitudinal gap in the guide plates 39' and 39. Adjacent to the web 49 and between adjacent ends of the guide plates 39' and 39 a transport roller 38 is provided, over which the cigarette blocks roll in their movement from the guide plates 39' to the guide plate 39. As can be seen from FIG. 2, the transport roller 38 is divided into two parts so as to allow the passage of the arms 48 of the pushing dogs 47, the two parts being mounted in cantilever manner by anti-friction bearings 79.

The shafts carrying the various rotatable parts are mounted between sidewalls 75 and 76, as shown in FIG. 2.

The manner of operation of the arrangement of FIGS. 1, 2 and 3 is as follows:

The foil web 49 is drawn from a roll of foil (not shown) by the feeding rollers 15.

The foil web 49 is fed vertically downwardly and moves downwardly between the counter roller 14 and the cutter.

When the amount of the web 49 which extends tangentially downwardly from the roller 14 has the length L_1+h+L_2 (FIG. 5), the cutter blade 1 cuts this section by pressure of the sharp cutter edge against the smooth counter roller 14. Simultaneously, the cigarette block 46 on the guide plate 39' is moved against the web by means of the pushing dog 47, so that the cut web portion is held by movement of the cigarette block 46 between the rollers 37 and 38, the cut web portion commencing to be disposed in a U-shaped about the cigarette block 46. Immediately after the cutting, the upper end of the web section L_2 is drawn against the suction block 27 by the application of suction to the suction apertures 28 thereof, by means of the valve 87 (FIG. 7) and is thus brought out of the plane of the succeeding shorter foil portion L_3 which is yet to be cut. The suction block 27 has the task of holding the longer foil section (of length L_1+h+L_2) for a short period after the cutting, until the cigarette block 46 with the said longer foil section has moved against the rollers 37 and 38. The foil, although held by suction against the suction block, slides downwardly therealong, until the end of the section L_2 of the longer foil portion releases the suction apertures 28.

During this time, the shorter portion L_3 overtakes the end of the section L_2 and thus forms the overlap U (FIG. 5), the arrangement of the eccentric spur wheels 24 and 25 being such that the preliminary feeding rollers 15, have at this instant a higher speed. After the overlap U has been formed, the condition of FIG. 3 is attained. The cutter blade 2 now cuts the shorter foil portion L_3 and simultaneously the roller 30 swings towards the roller 29. Both rollers 29 and 30 are driven at a peripheral speed equal to the speed which the cigarette block 49 has on the guide plate 39'.

Both foil portions L_1+h+L_2 and L_3 are thus jointly formed in a U-shaped manner about the cigarette block 46, while maintaining the overlap U. The overlap U is not disturbed, since the belt 41, which extends over the roller 40 and below the guide plate 42, is driven at the same speed as that of the cigarette block. Lateral folding of the foil onto the cigarette block 46 is effected in known manner while the cigarette block is on the guide plate 39.

A similar arrangement with alternate means for conveying the foil portions subsequent to cutting is illustrated in FIG. 4. The arrangement has a controllable deflecting bar 51 which is mounted on a lever 52 pivoted about a fixed pivot point 53. Three suction belts 54, 55 and 56 are provided, that is to say apertured belts which slide over vacuum chamber 57, 58, 59 respectively and into the region of which the wrapping foil is sucked. The suction belt 55 is entrained over three non-displaceably mounted belt rollers 63, 64 and 65 and the corresponding vacuum chamber 58 has openings 68 directed frontwardly towards the belt 55. The suction belt 54 lies opposite the belt 55 and is mounted for movement towards and away from the belt 55, by being entrained over three belt rollers 60, 61 and 62 mounted in the holder 31 for movement with the holder 31 in a manner similar to the roller 30 of FIG. 1. The vacuum chamber 57 has openings 69 at its side facing the belt 54. A fixed guide piece 45 is provided below the belt 54 for preventing the foil from being carried around with the belt 54. The third suction belt 56 is mounted below the guide plates 39' and 39 and is entrained over belt rollers 66 and 67. The vacuum chamber 59 has slots 70 at its side lying directly against the belt 56.

The arrangement of FIG. 4 is in other respects similar to the arrangement of FIGS. 1, 2 and 3, and similar parts have been given the same reference numerals.

The arrangement of FIG. 4, insofar as it differs from the arrangement of FIGS. 1, 2 and 3, operates as follows:

After the longer foil portion L_1+h+L_2 (FIG. 5) is cut by means of the cutter blade 1, the suction belts 55 and 56 take over the transport of this foil portion. The deflecting bar 51 presses the upper end of the cut foil portion laterally to one side in such manner that the as yet uncut shorter foil portion L_3 can run therepast and form the overlap U. The shorter foil portion, after it has thereafter been cut by the cutter 2, is held and transported by the suction belt 54. The suction belt 54, with the rollers 60, 61 and 62 and the holder 31 is then pressed against the suction belt 55 so that the transport of the cut foil portions can be additionally secured by frictional engagement of the belts 54 and 55, although feeding by movement of these belts, with the cut sections held on the belts only by the vacuum action may in some cases be sufficient. The suction belt 56 serves merely for holding the lower end of the longer foil portion, this portion being gradually drawn off the belt 56 as the cigarette block 46 moves onto the guide plate 39.

It should be clearly understood that the embodiments described herein are given by way of example only. Modifications, omissions and additions are possible without departing from the spirit of the invention.

I claim:

1. In a packing machine in which an article to be packed is embraced in a U-shaped manner by a wrapping having a longer and a shorter portion of wrapping material in overlapping relationship and in which the two wrapping material portions are cut from a single web of said material, the combination of a rotatable cutter, a counter roller positioned for cooperating with said cutter, a first cutter blade and a second cutter blade on said cutter for cutting by pressure against said counter roller, means for feeding a web of said wrapping material between said cutter and said counter roller prior to a cut effected by said first cutter blade, means for accelerating the feed of said wrapping material between said cutter and said counter roller subsequent to the cut effected by said first cutter blade and prior to a cut effected by said second cutter blade so as to bring a second cut portion

into overlap with a first cut portion, a first and second suction belt arranged along the path of movement of the wrapping material and after the cutter when viewed in the direction of feed of said wrapping material, for taking over the further transport of said longer wrapping material portion subsequent to cutting by said first cutter blade, and a third suction belt opposite said first suction belt for transporting the end of said shorter wrapping material portion into overlap with said longer wrapping material portion.

2. A combination as defined in claim 1, and comprising means mounting said third suction belt for movement towards and away from said first suction belt.

3. A combination as defined in claim 1, and comprising controllable means for deviating said longer wrapping material portion out of the path of movement of said shorter wrapping material portion prior to establishment of said overlap.

4. A combination as defined in claim 3, wherein the deviating means are mechanical means.

5. In a packing machine in which an article to be packed is embraced in a U-shaped manner by a wrapping having a longer and a shorter portion of wrapping material in overlapping relationship and in which the two wrapping material portions are cut from a single web of said material, the combination of a rotatable cutter, a counter element positioned for cooperation with said cutter, means for feeding a web of said wrapping material between said cutter and said counter element prior to a first cut being effected, means for accelerating the feed of said wrapping material between said cutter and said counter element subsequent to said first cut and prior to a second cut being effected so as to bring a second portion of said wrapping material into overlap with a first cut portion of said wrapping material, means for holding said longer wrapping material portion while said overlap is being established, said cutter comprising a rotatable shaft, a first cutter blade holder, a second cutter blade holder, first means on said first holder for attaching said first holder turnably to said shaft at a predetermined region thereof, second means on said second holder for attaching said second holder turnably to said shaft at said predetermined region, means for releasably fixing said holders on said shaft at said predetermined region, first means on said first holder for fixing a first cutter blade to said first holder, and second means on said second holder for fixing a second cutter blade to said second holder, said first and second attaching means being shaped and arranged on said first and second holders respectively to allow independent turning of said holders on said shaft at said predetermined region when said fixing means have been released for varying the relative angular position of said holders on said shaft for correspondingly varying the lengths of said longer and shorter portions of said wrapping material.

6. A combination as defined in claim 5, wherein said holding means comprise a stationary suction block arranged for holding said longer portion of wrapping material.

7. A combination as defined in claim 1, wherein said counter element comprises a cylindrical roller having a smooth surface for cooperation with said cutter.

8. A combination as defined in claim 1, wherein the axis of rotation of said shaft is substantially perpendicular to the direction of feed of said web of material at the proximity of said cutter.

References Cited by the Examiner

UNITED STATES PATENTS

2,021,310	11/1935	Jaeger	226—122 X
2,107,482	2/1938	Kemp	53—389 X
2,751,006	6/1956	Lane	83—674
2,895,552	7/1959	Pomper et al.	83—100 X
3,086,416	4/1963	Minarik	83—346 X
3,218,897	11/1965	Geigenmiller et al.	83—88

FOREIGN PATENTS

1,062,169	7/1959	Germany.

ANDREW R. JUHASZ, *Primary Examiner.*