Feb. 8, 1938. W. J. KEMP 2,107,482

WRAPPING OR PACKING MACHINE

Filed June 25, 1935 3 Sheets-Sheet 1

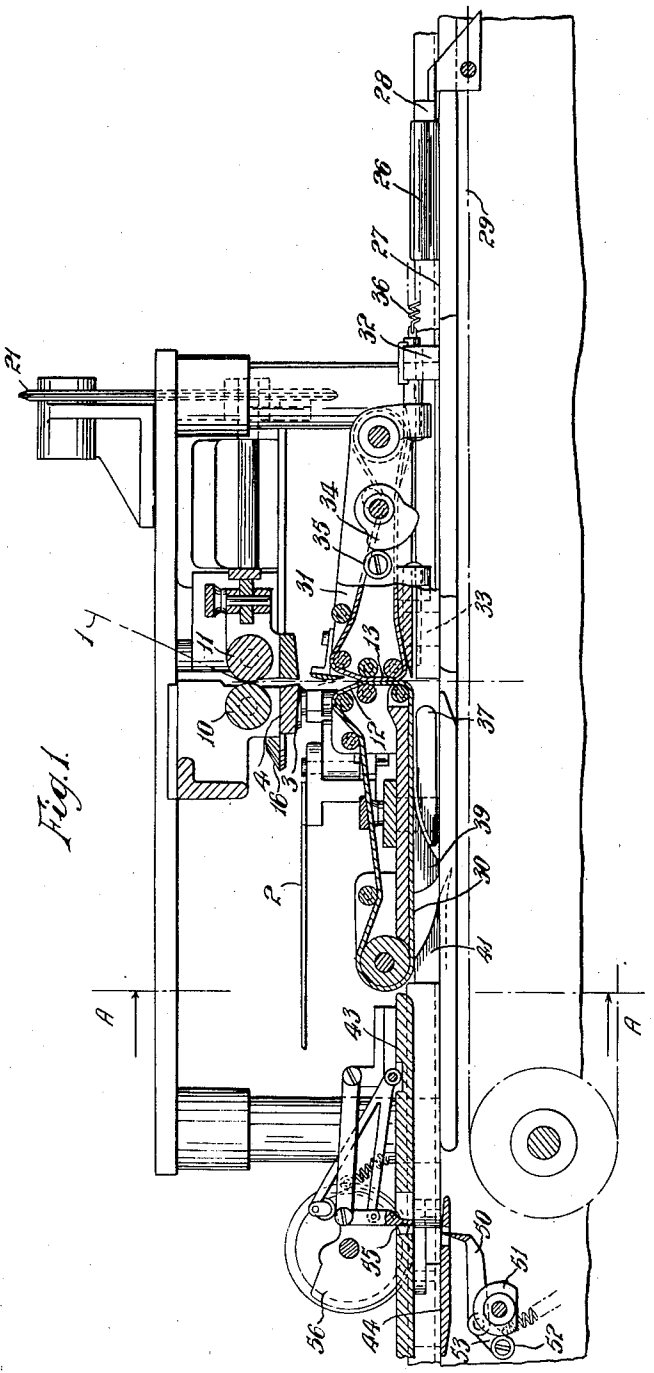

Fig. 1.

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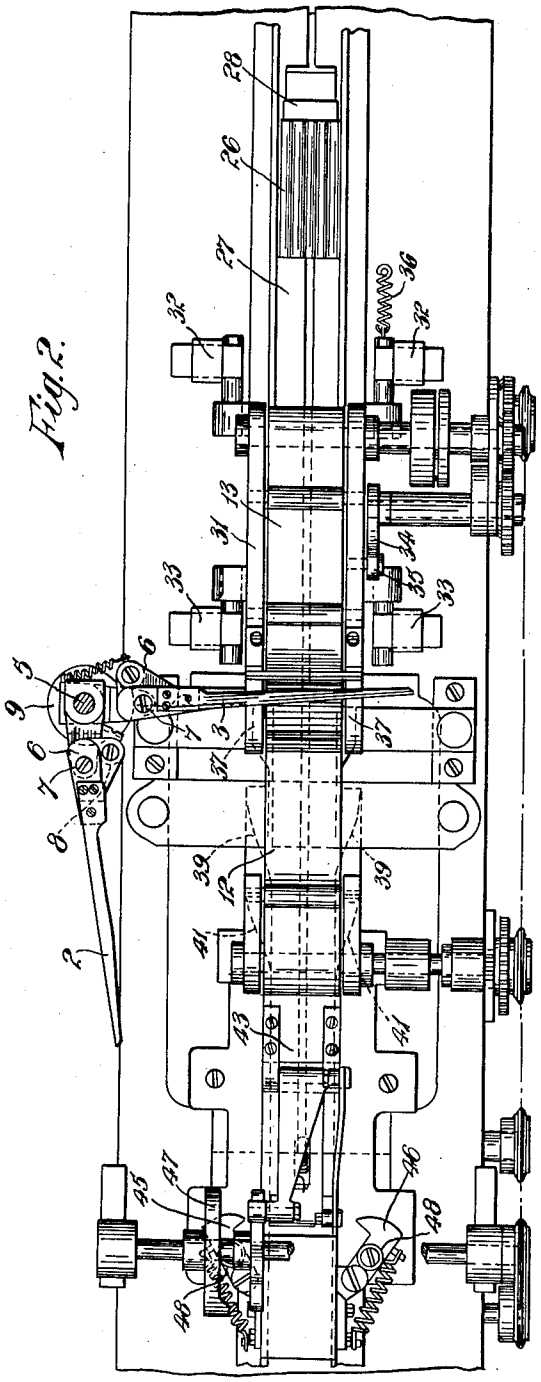
Fig. 2.



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Filed June 25, 1935 3 Sheets-Sheet 3

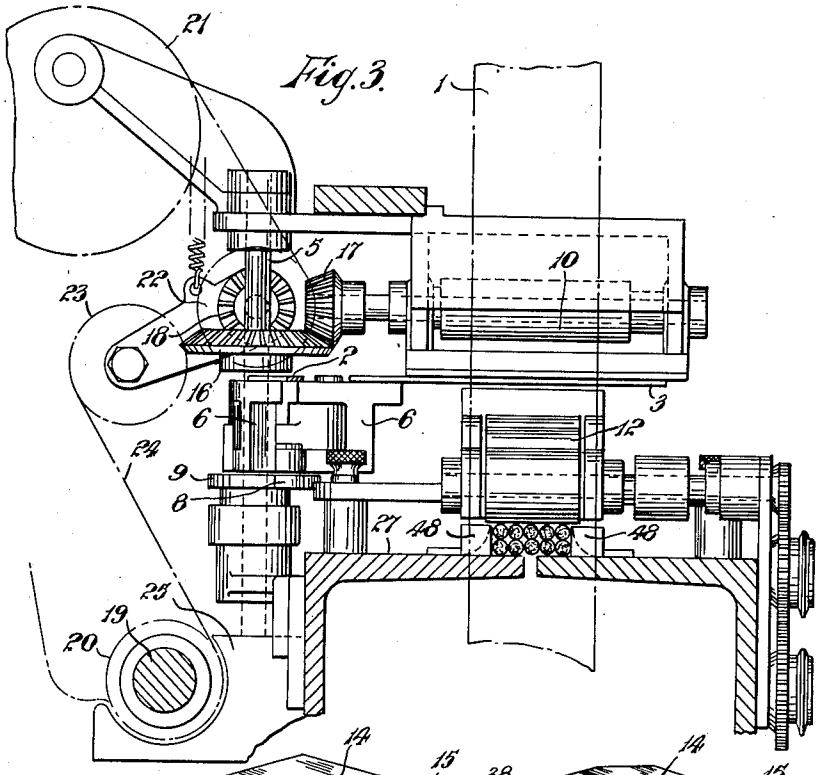

Fig. 3.

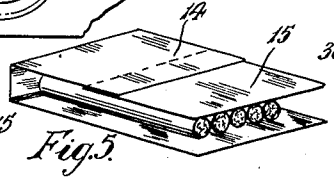

Fig. 5.

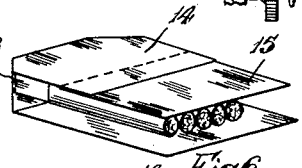

Fig. 6.

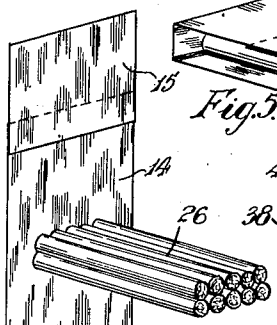

Fig. 4.

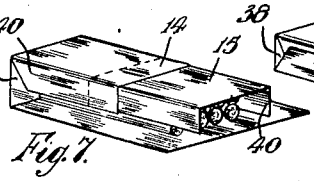

Fig. 7.

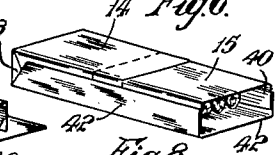

Fig. 8.

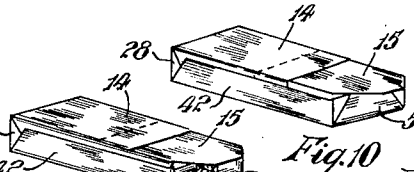

Fig. 10

Fig. 9.

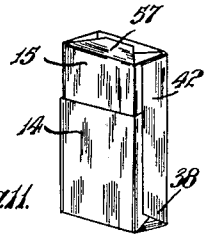

Fig. 11.

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Patented Feb. 8, 1938

2,107,482

UNITED STATES PATENT OFFICE

2,107,482

WRAPPING OR PACKING MACHINE

William Joseph Kemp, Deptford, London, England, assignor to Molins Machine Company, Limited, London, England

Application June 25, 1935, Serial No. 28,381
In Great Britain July 25, 1934

20 Claims. (Cl. 93—2)

This invention is for improvements in or relating to wrapping or packing machines, and refers to machines for wrapping or packing articles, such for example as batches of cigarettes. For the sake of convenience in describing the invention the term "cigarettes" will be used, but it is to be understood that the term is merely illustrative and is not in any way limited.

According to one form of the present invention, there is provided in or for a wrapping machine, apparatus comprising feeding means to feed wrapping material into the path of an article to be wrapped said feeding means being arranged to convey at least two lengths of material which overlap to form a composite wrapper for each article, means to fold the composite wrapper about the article, and control means acting on the composite wrapper to maintain the relative positions of the parts thereof for a part at least of the time during which the wrapper is being folded about the article.

According to another form of the present invention there is provided in a wrapping or packing machine, apparatus comprising feeding elements to feed a wrapper into the path of an article to be wrapped, a cutting device to sever lengths from a web of material to form a wrapper, said cutting device being operative to sever at least two lengths for each wrapper whilst a section of the feeding elements is operative to increase the speed at which the second severed length is fed so as to lap the leading edge of said second length over the rearward edge of the first severed length to form a composite wrapper and means to fold the wrapper about the article. Control means may be arranged to engage the composite wrapper to maintain the relative positions of the parts thereof for a part at least of the time during which the wrapper is being folded about the article, and the control means may comprise an endless band forming a part of the feeding elements and movable at the speed at which the article and wrapper are moved. A second endless band may be provided to co-operate with the control band during the feeding of the wrapper in the path of the article, said second band being movable in the direction in which the wrapper is fed, and at the same speed as that of the control band, and movable towards and away from the control band for a purpose to be hereinafter specified.

The cutting device may comprise at least two rotatable knives operative in synchronism, each knife being arranged to co-operate with a fixed knife to sever a length of material from the web to form a composite wrapper.

The invention will be more particularly described by way of example with reference to the accompanying drawings in which:

Figure 1 is a sectional elevation of a portion of a wrapping or packing machine having the invention applied thereto.

Figure 2 is a plan of Figure 1, with the upper structure of the apparatus omitted for the sake of clarity.

Figure 3 is a sectional elevation taken on the line A—A, Figure 1.

Figures 4 to 11 show the various stages through which the wrapper and article pass whilst the wrapper is being folded about the article.

Like references refer to similar parts throughout the specification and drawings.

Referring to the drawings, a web 1 of wrapping material is fed from a reel (not shown), and lengths are severed from the web by knives 2 and 3 which co-operate with a fixed knife 4 and operate in the manner about to be described.

The knives 2 and 3 are mounted for rotation on a spindle 5, each knife being carried upon an arm 6 to which it is pivoted at 7. On an extension of the arm 6 a cam follower 8 is provided, and co-operates with a fixed cam 9, the cam being so shaped that at the moment the knife operates to sever the web, it is moved at a faster velocity than that at which it moves during the remainder of its rotation.

The web is fed downwardly in a vertical plane, as shown in Figures 1 and 3, by feeding elements a part of which consists of a pair of rollers 10 and 11, the remaining part comprising a pair of rotatable bands 12 and 13 having equal linear speeds. The rollers 10 and 11 are arranged to draw the web from the reel, and they are rotated with a variable speed for a purpose about to be described.

The wrapper which is to be wrapped about the bath of cigarettes is a composite wrapper formed of at least two lengths 14 and 15 of material, as seen clearly in Figure 4. The lengths 14 and 15 are arranged to overlap each other in the manner shown, and in order to obtain the overlapped formation of the two lengths the rollers 10 and 11 are driven at a faster speed after the length 14 has been severed from the web, so that the leading edge of the portion 15 laps over the rear edge of the portion 14, as shown in Figure 4. In order to obtain the necessary increase in speed whilst feeding the portion 15, the rollers 10 and 11 are driven by a pair of bev-

elled gears 16, 17, the gear 16 being in turn driven from a bevelled pinion 18, which receives its motion from the main shaft 19 of the wrapping or packing machine. The pinion 18 is driven from the main shaft 19 through a system of sprocket wheels 20, 21, 22 and 23, the sprockets being connected by a chain 24 whilst the sprocket 21 is eccentrically mounted, as shown in Figure 3. A suitable guide 25 is provided to retain the chain 24 in engagement with the teeth of the sprocket wheel 20, whilst the chain is slack, as shown in Figure 3.

The bevelled gear 16 is fixed to the spindle 5, and serves also to drive the said spindle and the knives 2 and 3. It will be seen, therefore, that the knives are rotated in synchronism with the feed rollers 10 and 11.

After the lengths have been severed from the web in the manner described above, they are received by the bands 12 and 13 which move at the speed at which the cigarettes are fed along the machine.

A batch of cigarettes 26 is moved along the bed 27 of the machine by a pusher piece 28 carried by an endless conveyor 29, and the batch of cigarettes engages with the composite wrapper which is fed into its path and moves it between the bed 27 and the under-surface 30 of the band 12, thus forming the wrapper into a U about the batch of cigarettes as shown in Figure 5. The U formed by the wrapper is such that one limb thereof is formed solely from the length 14 of the wrapper, whilst the other limb is formed by a part of the length 14 and the length 15 which overlaps it. The limb of the U which is formed from both lengths of wrapping material is the limb which is engaged by the undersurface 30 of the band 12, and since the band 12 is moving at the same speed as that at which the composite wrapper and batch of cigarettes is moving, the band operates to control the superimposed lengths of wrapping material and to maintain them in position whilst it is passing through the folders about to be described.

The band 13 is carried by a series of rollers mounted on a carrier 31 which carrier is slidably mounted in blocks 32 and 33, and is reciprocated towards and away from the band 12 by means of a cam 34 driven from the main drive of the machine, the cam co-operating with a roller 35 secured to the carrier 31, whilst a suitable spring 36 is provided to retain the roller in engagement with the cam 34. The purpose of reciprocating the band 13 towards and away from the band 12 is to ensure that the portion 14 of the wrapper may be fed without interruption, since whilst this portion is being fed, the band 13 is out of engagement with the band 12. The band 13 is moved into engagement with the band 12 so that they engage at approximately the time when the overlapping lengths 14 and 15 arrive at a position such that they can be engaged and held in place by the co-operating bands 12 and 13. This purpose is referred to in the appended claims as the purpose specified.

After the wrapper has been engaged by the batch of cigarettes 26, and is formed into a U shape, the wrapper and cigarettes are passed through folding elements, the folders 37 being arranged to form the narrow end folds 38 shown in Figure 6, whilst the folders 39 fold down the portions 40 as shown in Figure 7, and the folders 41 fold upwardly the folds 42 shown in Figure 8. During the time in which these folding operations have been taking place, the lengths 14 and 15 have been held in their relative positions by the portion 30 of the band 12, as above described. When the folding operations just described have been completed, the partly folded wrapper and batch of cigarettes are moved by the pusher piece 28 beneath a fixed top plate 43, and are delivered on to a plate 44 on which they are left in a stationary position, the pusher piece 28 being tripped rearwardly out of engagement with the ends of the cigarettes by a suitable mechanism (not shown). After the pusher piece has been removed, a pair of folders 45 and 46 operated by cams 47 which engage with rollers 48 carried by the folders 45 and 46, operate to form the narrow end folds 49 (see Figure 9), after which the folder 50 operated by a cam 51, a cam follower 52 and lever 53, moves upwardly to form the broad end fold 54, shown in Figure 10. When the fold 54 has been made, a further folder 55 operated by a cam 56 moves downwardly and folds the remaining broad end flap 57 so that the wrapper is completely folded about the batch of cigarettes as shown in Figure 11. The completely wrapped batch of cigarettes is removed from the stationary position by the next succeeding batch of cigarettes moving on to the plate 44, although if desired suitable mechanical means may be provided to remove the completed batch, and the batch may then be delivered to other mechanism (not shown) by means of which it is placed into an outer container, such for example as a slide and shell carton.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a wrapping machine, the combination with web feeding means, of means to sever unequal lengths of material from a web, and means to assemble portions of material of unequal length to form a composite wrapper blank of desired length.

2. In a wrapping machine, the combination with web feeding means, of means successively to sever long and short lengths of material from a web, and means to assemble successive long or short lengths to form composite wrapper blanks of desired length.

3. In a wrapping machine, the combination with web feeding means, of means to sever unequal lengths of material from the web, means to assemble portions of material of unequal length to form a composite wrapper blank of desired length, and means to engage the assembled lengths forming a composite wrapper blank to retain said lengths in their relative position during a part at least of the time during which the blank is being folded about an article.

4. In a wrapping machine, the combination with web feeding means, of means successively to sever long and short lengths of material from a web, means to assemble successive long or short lengths to form composite wrapper blanks of desired length, and means to engage a composite wrapper blank to retain said lengths in their relative positions during a part at least of the time during which the blank is being folded about an article.

5. In a wrapping machine, the combination with web feeding means, of at least two cutting members operative in synchronism to sever alternate long and short lengths of material from a web, and means operative to accelerate the feeding means during the feeding of a shorter length whereby the shorter length overlaps the longer length to form a composite wrapper blank of desired length.

6. In a wrapping machine, the combination

with web feeding means, of at least two cutting members operative in synchronism to sever alternate long and short lengths of material from a web, means operative to accelerate the feeding means during the feeding of the shorter length whereby the shorter length overlaps the longer length to form a composite wrapper blank of desired length, and cooperating elements movable at the speed at which the blank is moving to retain the assembled lengths of material in their relative positions during a part at least of the time during which the blank is being folded about an article.

7. In a wrapping machine, the combination with web feeding means, of at least two cutting members operative in synchronism to sever alternate long and short lengths of material from a web, means operative to accelerate the feeding means during the feeding of the shorter length whereby the shorter length overlaps the longer length to form a composite wrapper blank of desired length, and opposed cooperating elements movable at the speed at which the blank is moving to retain the assembled lengths of material in their relative positions during a part at least of the time during which the blank is being folded about an article, at least one of said elements being movable in a plane substantially at right angles to that in which the wrapper blank is engaged by said elements, and toward and away from the element to which it is opposed.

8. In a wrapping machine, the combination with web feeding means, of at least two cutting members operative in synchronism to sever alternate long and short lengths of material from a web, means operative to accelerate the feeding means during the feeding of a shorter length, whereby the shorter length overlaps the longer length to form a composite wrapper blank of desired length, and cooperating elements movable at the speed at which the blank is moving to retain the assembled lengths of material in the relative position during a part at least of the time during which the blank is being folded about an article, one of said elements comprising an endless band operative to engage with the blank in two planes substantially at right angles one to the other.

9. In a wrapping machine, the combination with web feeding means, of at least two cutting members operative in synchronism to sever alternate long and short lengths of material from a web, means operative to accelerate the feeding means during the feeding of the shorter length whereby the shorter length overlaps the longer length to form a composite wrapper blank of desired length, and cooperating elements movable at the speed at which the blank is moving to retain the assembled lengths of material in their relative positions during a part at least of the time during which the blank is being folded about an article, one of said elements comprising an endless band operative to engage with the blank in two planes substantially at right angles one to the other, said other element being movable towards and away from said band in a plane substantially at right angles to that at which the wrapper blank is engaged by the cooperating elements.

10. In a wrapping machine, the combination with web feeding means, of at least two cutting members operative in synchronism to sever alternate long and short lengths of material from a web, and an eccentric drive operative to accelerate the feeding means during the feeding of a shorter length whereby the shorter length overlaps the longer length to form a composite wrapper blank of desired length.

11. In a wrapping machine, the combination with web feeding means, of at least two cutting members operative in synchronism to sever alternate long and short lengths of material from a web, an eccentric drive operative to accelerate the feeding means during the feeding of the shorter length whereby the shorter length overlaps the longer length to form a composite wrapper blank of desired length, and cooperating elements movable at the speed at which the blank is moving to retain the assembled lengths of material in their relative positions during a part at least of the time during which the blank is being folded about an article.

12. In a wrapping machine, the combination with web feeding means, of at least two cutting members operative in synchronism to sever alternate long and short lengths of material from a web, an eccentric drive operative to accelerate the feeding means during the feeding of the shorter length whereby the shorter length overlaps the longer length to form a composite wrapper blank of desired length, and opposed cooperating elements movable at the speed at which the blank is moving to retain the assembled lengths of material in their relative positions during a part at least of the time during which the blank is being folded about an article, at least one of said elements being movable in a plane substantially at right angles to that in which the wrapper blank is engaged by said elements, and toward and away from the element to which it is opposed.

13. In a wrapping machine, the combination with web feeding means, of at least two cutting members operative in synchronism to sever alternate long and short lengths of material from a web, an eccentric drive operative to accelerate the feeding means during the feeding of the shorter length, whereby the shorter length overlaps the longer length to form a composite wrapper blank of desired length, and cooperating elements movable at the speed at which the blank is moving to retain the assembled lengths of material in the relative position during a part at least of the time during which the blank is being folded about an article, one of said elements comprising an endless band operative to engage with the blank in two planes substantially at right angles one to the other.

14. In a wrapping machine, the combination with web feeding means, of at least two cutting members operative in synchronism to sever alternate long and short lengths of material from a web, an eccentric drive operative to accelerate the feeding means during the feeding of the shorter length whereby the shorter length overlaps the longer length to form a composite wrapper blank of desired length, and cooperating elements movable at the speed at which the blank is moving to retain the assembled lengths of material in their relative positions during a part at least of the time during which the blank is being folded about an article, one of said elements comprising an endless band operative to engage with the blank in two planes substantially at right angles one to the other, said other element being movable towards and away from said band in a plane substantially at right angles to that at which the wrapper blank is engaged by the cooperating elements.

15. In a wrapping machine, the combination with web feeding means, of means to sever portions of material from a web, and means to assemble successive portions of material to form a composite wrapper blank of desired dimensions.

16. In a wrapping machine, the combination with web feeding means, of at least two cutting members operative in synchronism to sever portions of material from a web, and means operative to accelerate the feeding means, whereby at least one severed portion overlaps a preceding severed portion to form a composite wrapper blank of desired dimensions.

17. In a wrapping machine, the combination of means to feed individual portions of wrapping material, the superficial area of each portion being insufficient completely to enclose an article to be wrapped, and means to assemble said portions of material in overlapping formation so as to form a composite wrapper blank, the superficial area of which is sufficient completely to enclose the article to be wrapped, the portions comprising a blank being capable of movement relatively one to another.

18. In a wrapping machine, the combination of means to feed individual portions of wrapping material, the superficial area of each portion being insufficient completely to enclose an article to be wrapped, means to assemble said portions of material in overlapping formation so as to form a composite wrapper blank, the superficial area of which is sufficient completely to enclose the article to be wrapped, the portions comprising a blank being capable of movement relatively one to another, and means to engage the assembled portions which form the composite wrapper blank to retain said portions in their relative position for a part at least of the time during which the blank is being folded about an article.

19. In a wrapping machine, the combination with web feeding means, of means to sever portions of material from a web, the superficial area of each portion being insufficient completely to enclose the article to be wrapped, and means to assemble a plurality of severed portions of material in overlapping relation so as to form a composite wrapper blank, the superficial area of which is sufficient completely to enclose the article to be wrapped, the portions comprising a blank being capable of movement relatively one to another.

20. In a wrapping machine, the combination with means to feed in a predetermined path an article to be wrapped, of means to feed individual portions of wrapping material, the superficial area of each portion being insufficient completely to enclose the article to be wrapped, into overlapping relation so as to form a composite wrapper blank, the superficial area of which is sufficient completely to enclose the article to be wrapped, the portions comprising a blank being capable of movement relatively one to another, and into a position intercepting said path.

WILLIAM JOSEPH KEMP.