

Jan. 12, 1971

W. F. C. WOODS

3,553,935

WRAPPING MACHINES

Filed July 22, 1968

4 Sheets-Sheet 1

Fig. 1A

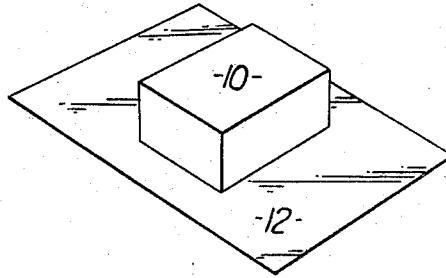


Fig. 1B

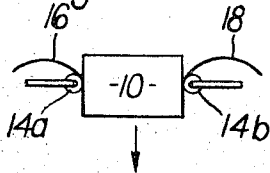


Fig. 1C

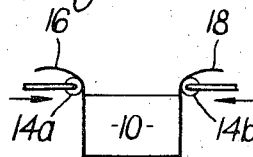


Fig. 1D

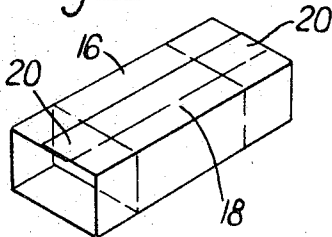


Fig. 1E

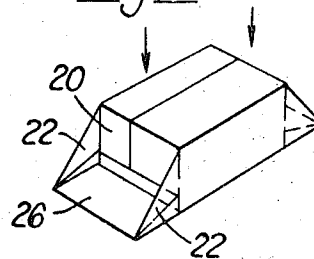


Fig. 1F

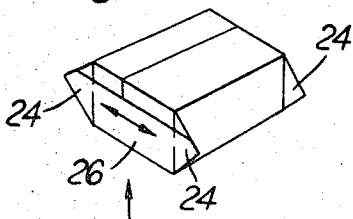
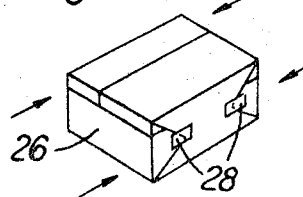


Fig. 1G



Inventor
WILLIAM F. C. WOODS,

By

Berman, Davidson & Berman
ATTORNEYS.

Jan. 12, 1971

W. F. C. WOODS

3,553,935

WRAPPING MACHINES

Filed July 22, 1968

4 Sheets-Sheet 2

Fig. 2H

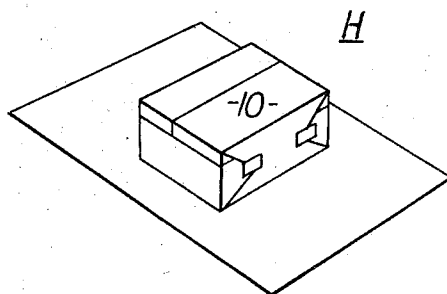


Fig. 2I

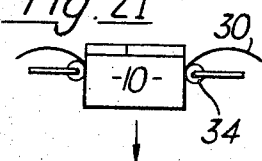


Fig. 2J

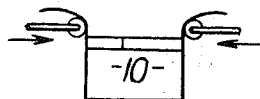


Fig. 2K

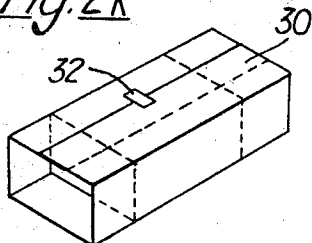


Fig. 2L

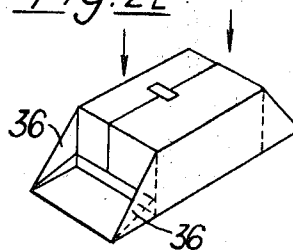


Fig. 2M

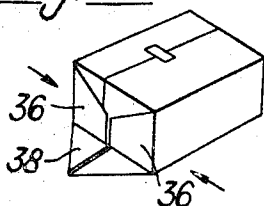
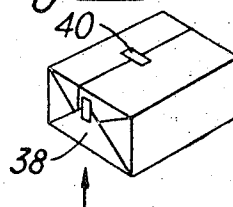


Fig. 2N



WILLIAM F. C. WOODS, ^{Inventor}
By *Berman, Davidson & Berman*

Attorneys

Jan. 12, 1971

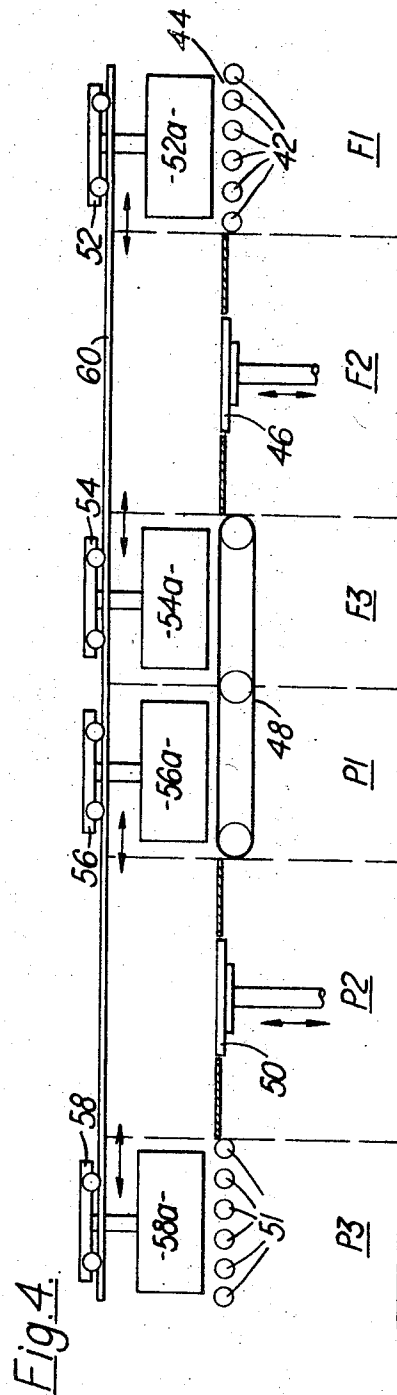
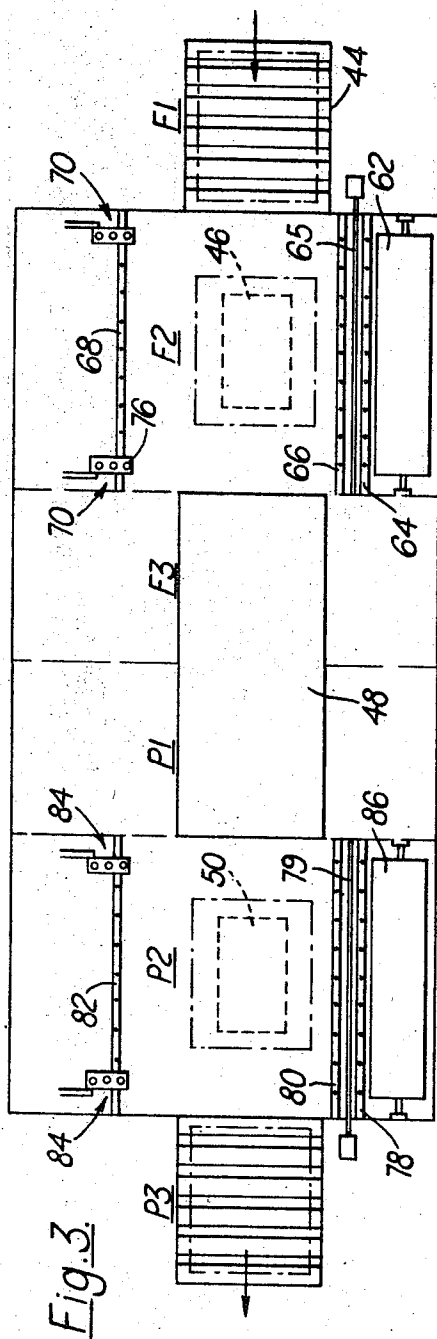
W. F. C. WOODS

3,553,935

WRAPPING MACHINES

Filed July 22, 1968

4 Sheets-Sheet 3



Inventor
WILLIAM F. C. WOODS,
By *Berman, Davidson & Berman*
Attorneys

Jan. 12, 1971

W. F. C. WOODS

3,553,935

WRAPPING MACHINES

Filed July 22, 1968

4 Sheets-Sheet 4

Fig. 5.

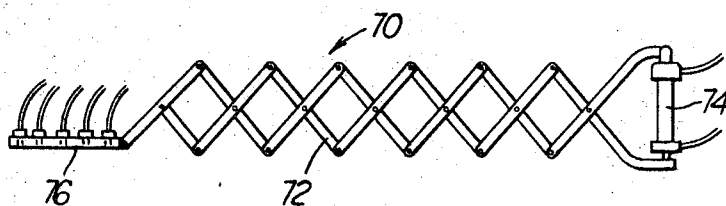
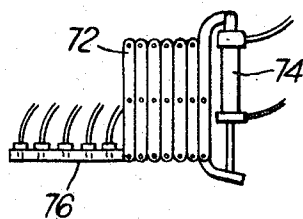


Fig. 6.



Inventor
WILLIAM F. C. WOODS,
By *Berman, Davidson & Berman*
Attorneys

1

2

3,553,935

WRAPPING MACHINES

William F. C. Woods, Carshalton Beeches, England, assignor, by mesne assignments, to Flower Faraday Limited, Wimborne, Dorset, England, a British company

Filed July 22, 1968, Ser. No. 746,590

Claims priority, application Great Britain, July 20, 1967, 33,420/67

Int. Cl. B65b 11/02

U.S. Cl. 53—209

5 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for wrapping blocks with plural layers of protective sheet material which includes means for conveying each block through two stations in turn, each station having a support for a roll of sheet wrapping material, a power-operated pulling device for pulling a length of wrapping material from the roll, a cutting device for severing the pulled length of wrapping material, and a system of power-operated folding and sealing means for folding about the block and sealing the portion of wrapping material severed by the cutting device.

This invention relates to the wrapping of a block in two layers of protective material such as film, metal foil or paper and is particularly applicable to the wrapping of a block of cheese weighing upwards of 10 lb.

Hitherto such wrapping has had to be carried out manually or in two stages on a conventional wrapping machine. This is costly in terms of time and labour and does not lend itself to modern flow production methods.

According to the present invention, apparatus for wrapping blocks in two or more layers of protective sheet material comprises means for conveying each block through two stations in turn, each station having a support for a roll of sheet wrapping material, a power-operated pulling device for pulling a length of sheet wrapping material off the roll, a cutting device for severing that length of sheet wrapping material from the roll, and a system of power-operated folding and sealing means for folding about the block and sealing the portion of sheet wrapping material severed by the cutting device.

Preferably, blocks to be wrapped are fed to the machine by a mechanical conveyor, such as a roller conveyor, and are automatically selected one at a time by the machine, fed through the two wrapping stations, and discharged on to a further conveyor or on to a table from which they can be removed manually or by mechanical means. The machine may be so arranged that as soon as a block is transferred out of the first wrapping station, a further block will be accepted into the machine and the wrapping of it commenced at the first wrapping station while wrapping of the first block is completed at the second wrapping station. Each operation in the process of feeding a block through the machine is initiated by the completion of a previous operation, so that, while at least two blocks may be undergoing different stages of wrapping at the same time, the second block cannot overrun the first block and cause jamming or other faulty operation of the machine.

Each layer of wrapping material is sealed independently, and sealing may be effected by such means as adhesive tape, the direct application of an adhesive or, where film of the heat-sealing variety is used, by the application of heat.

The method of wrapping a block and the operation of a machine for wrapping blocks of cheese in accordance with the invention are shown by way of example in the accompanying drawings in which:

FIGS. 1A–1G diagrammatically illustrate the stages

A, B, C, D, E, F and G by which the first layer of wrapping is applied;

FIGS. 2H–2N diagrammatically illustrate the stages H, I, J, K, L, M and N by which the second layer of wrapping is applied;

FIG. 3 is a diagrammatic plan view of a machine for wrapping blocks of cheese;

FIG. 4 is an elevation of the machine shown in FIG. 3;

FIG. 5 is a view of a picker arm on the machine in its extended position; and

FIG. 6 is a view of the picker arm in its contracted position.

As indicated above, FIGS. 1A–1G show the manner in which a first wrapping, consisting of a film of cellulose or synthetic plastic material, is applied to a block of cheese 10 or to a block of any other substance which requires wrapping. The first step is that the block 10 is placed on a sheet of film 12 which has been cut to the size required to wrap the block, as shown at Stage A (FIG. 1A). The block 10 is then moved downwards in relation to two rollers 14a, 14b as shown at Stage B (FIG. 1B), the effect of this being to fold the film up the sides of the block to the point shown at Stage C (FIG. 1C). The roller 14a then moves inwards across the top of the block, folding the flap 16 down on to the block. As the roller 14a moves back outwards towards its original position, the roller 14b moves inwards to fold the flap 18 into position on top of the block, the roller 14b remaining on the flap 18 to hold it in position. The position of the flaps is now as at Stage D (FIG. 1D), the roller 14b being omitted for the sake of clarity.

At Stage E (FIG. 1E), a pair of rollers (not shown) moves downwards, one at each end of the block, to fold the flaps 20 downwards as shown. A pair of ear-forming plates (not shown) at each end of the block then moves outwards, one at each side, to fold the gussets 22 into the form of ears 24 (Stage F). The forming of these ears raises the flaps 26 into the position shown at Stage F (FIG. 1F), but to ensure that the flap 26 is closely folded against the block, a further roller at each end (not shown) rises up the end to press the flap firmly against the block and to hold it in position.

To complete the first wrapping operation, a pair of rollers (not shown) at each end moves inwards, one along each side of the block, to fold the ears 24 into the position shown at Stage G (FIG. 1G), each of these rollers being equipped with a sealing device which seals the ears in position, for example by applying to each ear a short piece of adhesive tape 28.

All the rollers which have not already done so now return to their initial positions, and the block is raised clear of the rollers 14a and 14b.

A second wrapping, in this instance of paper, is applied in the manner indicated in FIGS. 2H–2N. Stages H, I, J, K and L are similar to the corresponding Stages A, B, C, D and E described with reference to FIGS. 1A–1E, except that in this case the flap 30 is secured in position by means such as a piece of adhesive tape 32, so that the roller 34 corresponding to the roller 14b in FIG. 1B need not remain on top of flap 30 to hold it in position but may be retracted to its initial position as soon as the flap 30 has been secured. At Stage M (FIG. 2M), the gussets 36 are folded inwards by a pair of rollers (not shown) at each end of the block 10, one roller moving inwards at each end to fold the gusset as shown, the rollers then being retracted to their initial positions. Finally, a roller moves upwards at each end to raise the flap 38 into the position shown at Stage N (FIG. 2N), the flap 38 being secured by such means as a piece of adhesive tape 40. The block is then raised to its initial position.

3

FIGS. 3 and 4 illustrate the machine for carrying out the wrapping method described above, the machine having six stations F1, F2, F3, P1, P2 and P3 as follows.

F1 is an entry station, where blocks of cheese are received on a "platform" 44 consisting of free running rollers 42 (see FIG. 4). Each block is delivered on to the platform 44 by a suitable conveyor, such as a roller conveyor.

F2 is a first wrapping station, at which the block, resting on a platform 46, is wrapped with a layer of film as described with reference to FIG. 1.

F3 is a first transfer station, to which the block is moved when the wrapping at F2 is complete.

P1 is a second transfer station, to which the block moves from station F3 on a conveyor 48.

P2 is a second wrapping station, at which the block, resting on a platform 50, is wrapped with a layer of paper as described with reference to FIGS. 2I-2N.

P3 is a discharge station to which the block is moved when the wrapping at station P3 is complete, and which comprises a set of free-running rollers 51 similar to the rollers 42. From here the block is displaced on to a conveyor by succeeding blocks arriving from station P2.

The transfer of each block from F1 to F2, F2 to F3, P1 to P2 and P2 to P3 is carried out by four handling devices consisting of trolleys 52, 54, 56 and 58 respectively, running on a track 60, and each carrying an air-operated clamp 52a, 54a, 56a and 58a respectively. Each trolley is moved from one to the other of the pair of stations which it serves by means of a pneumatic cylinder (not shown).

At the first wrapping station F2, a roll of film 62 is mounted at one side of the machine with its axis parallel to the direction of motion of the block through the machine. The end of the film rests on a suction bar 64 which is perforated so that, when suction is applied to it, the film is held firmly against the bar. This bar is close to the roll of film and parallel to the axis of the roll. A second suction bar 66 lies parallel to the bar 64 and a short distance away from it towards the centre line of the machine. A third suction bar 68 lies parallel to the others but on the opposite side of the machine.

On the same side of the machine as the bar 68, two picker arms 70 are mounted, these being shown in more detail in FIGS. 5 and 6. Each of these consists of a lazy tong 72, operated by a pneumatic cylinder 74, and carrying at its outer end a suction plate 76. When the tongs are folded, as in FIG. 6, the suction plates 76 lie just above the suction bar 68. The tongs are guided so that, as they are extended as in FIG. 5, the suction plates 76 move across the machine towards the roll of film 62 and, at full extension of the tongs, come to rest just above the end of the film which rests on the suction bar 64.

There is a similar arrangement of suction bars 78, 80 and 82 and picker arms 84 at the second wrapping station P2, where instead of a roll of film there is a roll of paper 86.

A guillotine 65 operates between the suction bars 64 and 66 to cut the film when required and there is a similar guillotine 79 between the suction bars 78 and 80 to cut the paper.

Adjacent to each of the platforms 46 and 50 is a pair of rollers 14a and 14b as described with reference to FIG. 1.

At the first wrapping station F2 there is a system of rollers and ear-forming plates arranged to perform the folding and sealing operations, described with reference to Stages E, F and G in FIGS. 1E-1G, and at the second wrapping stage P2 there is a further system of rollers to perform the folding and sealing operations described with reference to stages L, M and N in FIGS. 2L-2N. Both these systems are mounted on overhead runways and can be retracted to the side of the machine when not required to carry out folding operations.

A cycle of operations is initiated by the feeding of a

4

block into the clamp 52a which is at rest at station F1. When the block has fully entered the clamp, it operates a valve (not shown) which actuates the picker arms 70 so that they move to their extended positions. Suction is applied to the suction plates 76 while being cut off from the suction bars 64, 66 and 68. As a result, the end of the film is picked up by the suction plates 76 and the lazy tongs 72 contract, carrying the end of the film across the platform 46 to a position above the suction bar 68. Suction is then cut off from the suction plates 76 and applied to the suction bars 64, 66 and 68, so that the film is held firmly against them.

The clamp 52a closes to grip the block and the guillotine 65 at station F descends to cut the film. The guillotine ascends, and the trolley 52 moves along the track 60, carrying the block to a position above the platform 46, where the trolley stops. The clamp opens, releasing the block on to the film on the platform 46, suction is cut off from the suction bars 66 and 68 leaving the cut piece of film free, and the trolley 52 and clamp 52a moves back to their initial position at station F1.

The block resting on the film on the platform 46 is now wrapped as described with reference to FIGS. 1A-1G. On completion of this wrapping operation, the trolley 54 moves from station F3, where it has been at rest, to station F2, at the same time starting the conveyor belt 48. The clamp 54a grips the block, and the trolley 54 moves back to the station F3 where the clamp 54a opens, depositing the block on the moving conveyor belt.

The conveyor belt carries the block into the clamp 56a attached to the trolley 56 which is at rest at station P1. This starts a cycle of operations through the stations P1, P2 and P3 similar to that which has already taken place through F1, F2 and F3, and the doubly-wrapped block is finally deposited on the rollers 51 at station P3, from where it may be removed by a conveyor or any other convenient means.

While a block is being handled at station F1, F2 or F3, a gate (not shown) is kept closed to prevent a further block from entering station F1. As soon as F1, F2 and F3 are clear, this gate is opened, so that the next block to be delivered to the machine can be accepted in station F1 and the application of its first wrapping commenced. Thus, it is quite possible for two blocks to be passing through different stations on the machine at the same time.

The above description relates to the application of two layers of film, foil or paper to a block, but will be appreciated that additional layers may be applied if required, this necessitating simply the addition of further similar sets of stations to the wrapping machine.

I claim:

1. Apparatus for wrapping blocks, for example blocks of cheese, in at least two layers of protective sheet material, comprising a first wrapping station and a second wrapping station, each station having a support for a roll of sheet wrapping material, a power-operated pulling device for pulling a length of sheet wrapping material off the roll, a cutting device for severing that length of sheet wrapping material from the roll, and a system of power-operated folding and sealing means for folding about the block and sealing the portion of sheet wrapping material severed by the cutting device, the said apparatus also having a track extending between the said two stations, a plurality of trolleys movable along said track, and clamps supported on said trolleys for conveying each block through the said two stations in turn.

2. Apparatus according to claim 1, in which each station has one or more suction bars to hold pulled-off lengths of wrapping material from the respective roll in the desired position for wrapping to take place.

3. Apparatus according to claim 1, in which the system of power-operated folding means at the stations include rollers which are adapted to roll over selected sur-

5

faces of the block so as to fold the sheet wrapping material severed at the stations about the block.

4. Apparatus according to claim 3, in which a vertically-movable platform for supporting the block is provided at each station, each platform being movable up and down so as to effect relative movement between the block and the wrapper-folding rollers.

5. Apparatus according to claim 1, in which the pulling device for pulling a length of sheet wrapping material from the roll at the stations comprises one or more suction elements mounted on one or more extensible arms

6

which pull the wrapping material by being retracted from their extended position.

References Cited

UNITED STATES PATENTS

2,821,054	1/1958	Ritscher	53—170
3,343,334	9/1967	Bode et al.	53—389X
3,355,166	11/1967	Plumb	53—389X

H. A. KILBY, JR. Primary Examiner