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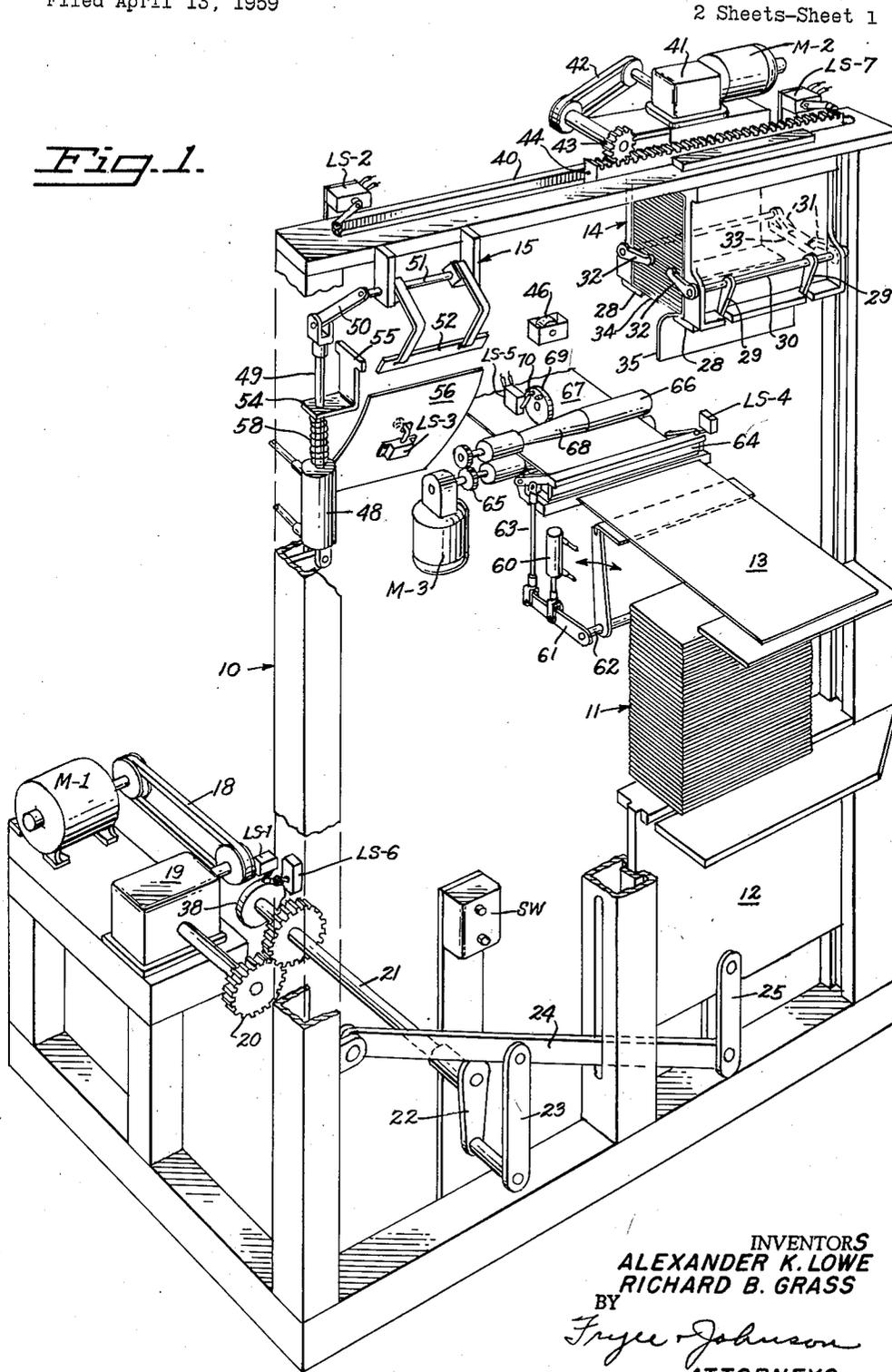
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3,030,750

PRESS AND BANDER FOR PAPER BAGS OR THE LIKE

Filed April 13, 1959

Fig. 1.



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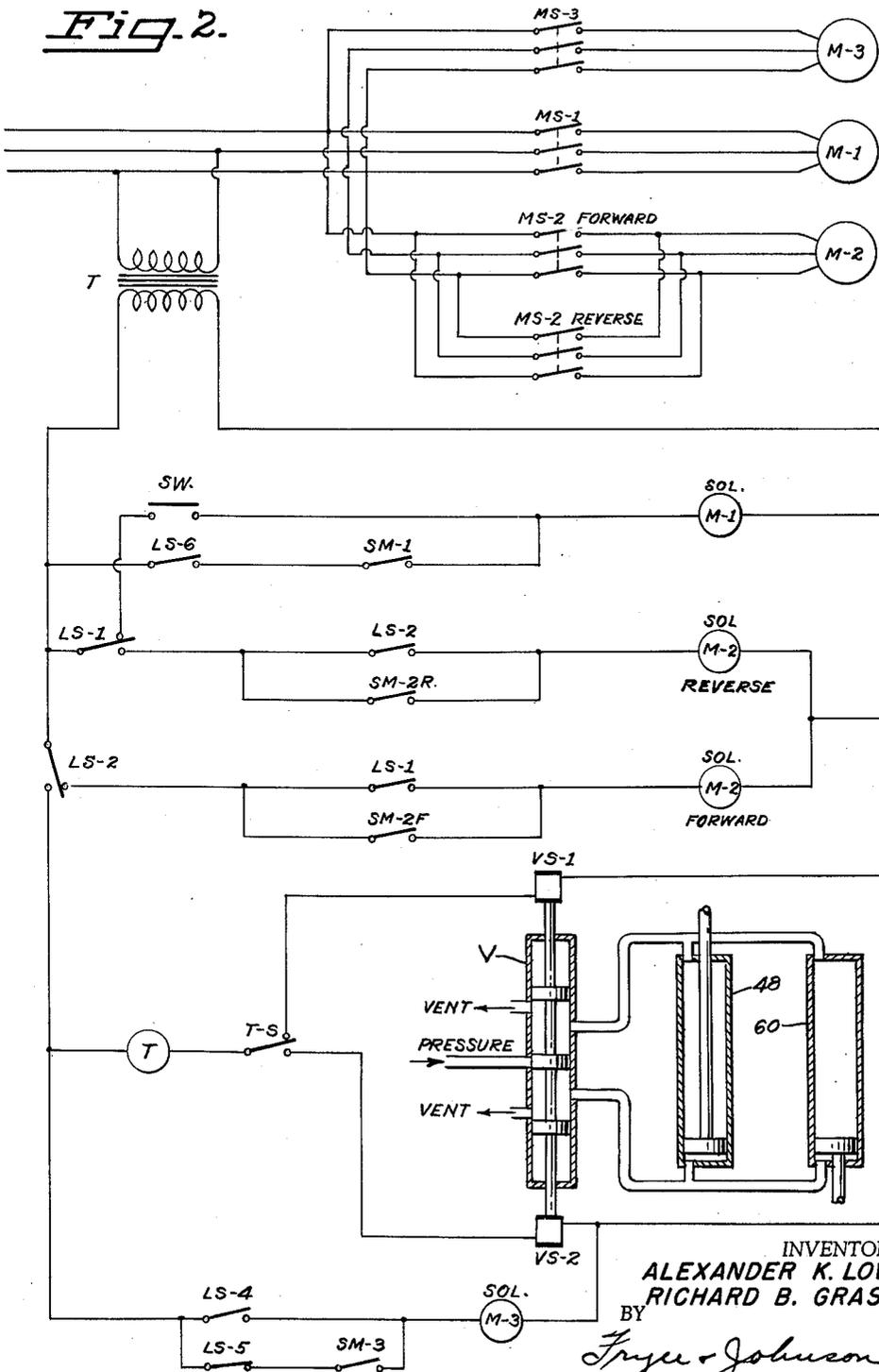
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2 Sheets-Sheet 2

Fig. 2.



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**PRESS AND BANDER FOR PAPER BAGS
OR THE LIKE**

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This invention relates to a machine for packaging paper bags or similar articles by compressing a stack of the articles and securing them in a compressed state with an encircling band of paper.

In the manufacture of paper bags, which are used herein as an example of one type of article that may be packaged, the bags are deposited in a stack at the delivery end of a conventional bag making machine. This stack is separated into stacks of a predetermined number of bags which are then packaged for convenient shipment and sale.

It is the object of this invention to provide a machine which upon receipt of a stack of bags or the like will compress the stack while wrapping a sheet of paper around it, then while holding the stack in a compressed state, apply adhesive to the paper and apply sealing pressure thereto.

Another object is to provide, in such a machine, means to feed a web of wrapping paper into the path of the stack being compressed and means to shear the paper into proper lengths for the stacks being packaged.

Another object is to provide automatic means which causes the proper sequential operation of the compressing, wrapping, sealing and discharge mechanisms of the machine when a single cycle of operation is initiated and which also conditions all of said mechanisms for the next cycle as each cycle is completed.

Further and more specific objects and advantages of the invention are made apparent in the following specification wherein reference is made to the accompanying drawings.

In the drawings:

FIG. 1 is a schematic perspective view of a machine embodying the present invention illustrating the major operating portions of the machine, and

FIG. 2 is a schematic diagram illustrating the electrical and pneumatic circuits embodied in the machine.

In FIG. 1 of the drawings, a framework is generally indicated at 10 with those parts omitted which are not essential to an understanding of the invention. A loose stack of paper bags or other similar articles to be compressed and packaged is generally indicated at 11 as having been placed on a vertically movable ram 12. A wrapper or sheet 13 of paper or like material with which the stack is to be wrapped is disposed over it and carried upwardly by it when the ram moves upwardly carrying the stack and wrapper into the space between side walls of a carriage 14. The stack is here compressed and the wrapper is folded downwardly to be flat against its sides. The carriage 14 is adapted to move in a horizontal plane with the stack held in its compressed position toward a sealing station 15 where the stack is held until an adhesive previously applied to the wrapper is sufficiently dry to retain the wrapper in place. Release of the stack after a predetermined time period effects completion of the cycle and conditions the various elements of the machine for a second cycle.

More specifically, the ram 12 is actuated by a motor M-1 which through a belt 18, gear reduction box 19 and gears 20 drives a countershaft 21. This shaft carries a crank arm 22 connected by a link 23 with a pivoted lever 24 and this lever is connected by links 25 with the

ram 12 so that upon one complete rotation of the countershaft 21, the ram 12 is raised and lowered. When the stack 11 is carried upwardly by the ram 12, the wrapper or band 13 already cut to length is disposed above it and carried upwardly with it so that side walls of the carriage 14 cause the band 13 to be folded downwardly along the sides of the stack as it is compressed into the carriage. The carriage is provided with sliding bottom plates 28 actuated by arms 29 on shafts 30 which are rotatably mounted and have closing levers 31 fixed to one end and opening levers 32 fixed to the opposite end. At the end of its upward stroke, the head of the ram 12 engages a sliding plate with a closing bar 33 thereon which strikes the closing levers 31 swinging them upwardly and moving the bottom plates 28 inwardly to the position shown where they serve to fold the band 13 under the bottom edges of the stack, the band being positioned to provide a short end 34 close to the bottom of the stack and a long end 35 hanging downwardly therefrom. At this time, the countershaft 21 has rotated through approximately 190° and a cam 38 on the countershaft engages and closes a limit switch LS-1 to close a circuit to a motor M-2 above the carriage 14 to drive the carriage horizontally along a slide or track 40.

A motor M-2 operates through a gear reduction box 41 and belt 42 to drive a gear 43 in mesh with a rack 44 which is fixed with respect to the carriage 14 in a position above the track 40. The carriage continues its leftward movement until some part of it such as the end of the rack 44 engages a limit switch LS-2 breaking the circuit to the motor M-2 and bringing the carriage to rest at the clamping station 15. During movement of the carriage toward the clamping station 15, the short end 34 of the wrapper 13 has passed over a gluing device illustrated for example as a roller 46 which applies a suitable quantity of adhesive to its underside. The actuation of limit switch LS-2 also closes the circuit to a solenoid and starts the operation of a timer. The solenoid actuates a valve in a manner later to be described to admit fluid such as air to the head end of a pneumatic cylinder 48. This moves the piston rod 49 thereof upwardly and through its connection with a crank arm 50 on a shaft 51 a clamping plate 52 is swung inwardly and upwardly to swing the depending end 35 of the wrapper upwardly against the bottom of the stack and into contact with the area of adhesive on the short end 34. This position of the seal arm is held for a time, the length of which is determined by the timer, sufficient to permit setting of the adhesive to secure the band in place about the compressed stack.

At the expiration of the timer cycle, it effects energization of a second solenoid to reverse the position of the valve supplying air to the cylinder 48 so that air enters the rod end of the cylinder to swing the plate 52 away from its clamping position. The same downward movement of the piston rod 49 which removes the sealing plate moves a bracket 54 downwardly, the bracket being secured to the piston rod. An actuating bar 55 of the bracket 54 engages the opening levers 32 to swing them downwardly and slide the plates 28 outwardly from beneath the edges of the banded stack or package permitting it to fall. The falling package strikes a curved plate or chute 56, which may be employed for directing it toward a conveyor or the like, and engages the actuating arm of a limit switch LS-3 in passing. Momentary closing of switch LS-3 effects energization of the motor M-2 in the opposite direction for returning the carriage to its original position in readiness for the start of a second cycle of operation of the machine. In order that the actuating bar 55 carried on the piston rod of the cylinder 48 will assume a normally raised position so that the opening levers 32 on the carriage 14 will be beneath it when the carriage moves to the sealing sta-

tion, a spring 58 shown as encircling the piston rod 49 is disposed between the bracket 54 and the top of the cylinder 48 in a position to be compressed upon full downward movement of the piston rod when air is released from the cylinder. The spring returns the piston rod and bracket upwardly to a position slightly higher than the normal closed position of the opening levers 32. A limit switch LS-7 is engaged when the carriage reaches its original position above the ram 12 breaking the circuit to motor M-2 to prevent further travel. While the carriage was at the sealing station, continued operation of the motor M-1 returned the ram 12 to its lowermost position and the cam 38 on the countershaft 21, after 360° rotation, engaged the limit switch LS-6 breaking the circuit to the motor M-1.

Meanwhile when limit switch LS-2 was engaged by the carriage to actuate an air valve, the same air valve also directed air to the rod end of a cylinder 60. The piston rod of the cylinder is connected to a lever 61 fixed to a rotatable shaft 62. A connecting rod 63 connects the lever 61 with the pivoted support of a knife blade 64 employed to shear the paper 13 used for banding the stack of bags. Raising of the knife blade actuates a momentary contact limit switch LS-4 to close a circuit to a motor M-3 which, through suitable gearing 65, drives feed rollers 66 for a web of paper 67 leading from a supply roll not shown. The uppermost of the feed rollers 66 has a tapered portion 68 and a measuring wheel 69 which is adjustable longitudinally of the tapered portion 68 is driven by the roller and carries a pin 70 to engage a limit switch LS-5 for deenergizing the motor M-3 when a predetermined length of paper has been fed beneath the knife blade and is in position to be sheared by downward movement thereof. Adjustment of the measuring wheel along the tapered portion of the roller varies the length of the wrapper to accommodate bags or stacks of different sizes.

FIG. 2 of the drawings is a schematic electrical and pneumatic circuit diagram showing the three motors previously described in a high voltage circuit, energy for the control circuit being taken through a transformer T. In the control circuit, a starting switch SW, illustrated in FIG. 1 as mounted in a convenient position adjacent the operator's station, is closed to complete a momentary circuit to a solenoid M-1 which closes switch MS-1 to motor 1 in the main circuit. The solenoid also closes a relay switch SM-1 and a holding circuit including limit switch LS-6. The limit switch LS-6 is held open by the lobe of cam 38 when the machine is at rest but closes instantly upon starting of motor 1 which drives the cam and also serves later to break the holding circuit to motor 1 to deenergize the motor when the ram 12 has completed its full cycle. When limit switch LS-1 is closed by the lobe on the cam 38, it momentarily energizes solenoid M-2 to close the switch MS-2. Forward in the circuit of motor 2 to drive the carriage forwardly or toward the sealing station 15 of FIG. 1. The solenoid M-2 Forward also energizes a relay switch SM-2F in a holding circuit so that the motor continues to operate until the carriage actuates limit switch LS-2 opening the circuit to the solenoid and closing the timer circuit. When the compressed and banded bags fall from the carriage and close limit switch LS-3, it completes a momentary circuit to the return solenoid M-2 which closes switch MS-2 Reverse to motor 2 and also closes relay switch SM-2R in a holding circuit, it being understood that at this time limit switch LS-7 is in the position opposite to that shown. Limit switch LS-7 serves the double purpose of breaking the circuit to return solenoid M-2 when the carriage reaches its home position and closing the circuit which includes the starting switch SW for motor 1, thus motor 1 cannot be started unless the carriage is in its home position in readiness to receive the bags that will be carried upwardly toward it by the ram 12. Limit switch LS-2 also serves the double purpose

of stopping motor M-2 at the sealing station and simultaneously closing the circuit to a timer T through which a solenoid VS-1 is energized to actuate a spool valve V to direct air under pressure to cylinders 48 and 60 which respectively close the clamping blade 52 at the sealing station and raise the knife 60 at the end of the period measured by the timer. The position of the timer switch TS is reversed deenergizing solenoid VS-1 and energizing solenoid VS-2 to reverse the position of the valve and reverse the operation of the cylinders 48 and 60, thus releasing the banded bags and shearing the paper for the next stack of bags.

Meanwhile upward movement of the shearing knife closed LS-4 completing a circuit to solenoid M-3 controlling motor switch MS-3 to motor 3 and also closing a relay SM-3 in a holding circuit later broken by the opening of limit switch LS-5 when the proper length of paper has been fed beneath the knife. The valve in the pneumatic circuit is of a conventional spool-type, the conventional operation of which may readily be understood from the schematic drawing where it will be understood that upward movement of the spool in its cylinder will connect a pressure inlet with the piston end of cylinder 48 and the rod end of cylinder 60 and connect the opposite ends of the cylinders with the uppermost vent of the valve. The reverse operation is obtained by downward movement of the valve spool. The normal or neutral position of the valve is that shown where the cylinders 48 and 60 both communicate with atmosphere through the vents and this is important particularly in connection with the cylinder 48 because it permits free movement of its piston under influence of the spring 58 which, as previously described, effects proper positioning of the member 55, the function of which is to release the banded bags from the carriage.

While the various elements of the machine herein disclosed are more or less schematically illustrated and described as specific types of mechanisms and sources of motive power, it is not intended thereby to limit the more general features of the invention defined by the claims but only to disclose one typical means for accomplishing each function of which the machine is capable.

We claim:

1. A machine for compressing and banding a stack of paper-like articles to form a package thereof which comprises a carriage movable between a receiving station and a sealing station and having a pair of spaced apart opposite walls, means to move a stack of articles into the carriage and compress it therein with a securing band partially surrounding it, clamping means cooperable with said walls for holding the stack in compressed state, means to move the carriage and compressed stack to the sealing station, means to apply an adhesive adjacent one end of the securing band as the carriage moves, and means at the sealing station to move the other end of the band against the adhesive and to hold it there while the stack remains compressed in the carriage.

2. A machine for compressing and banding a stack of paper-like articles to form a package thereof which comprises a carriage movable between a receiving station and a sealing station and having a pair of spaced apart opposite walls, means to move a stack of articles into the carriage and compress it therein with a securing band partially surrounding it, clamping means cooperable with said walls for holding the stack in compressed state, means to move the carriage and compressed stack to the sealing station, means to apply an adhesive adjacent one end of the securing band as the carriage moves, means at the sealing station to move the other end of the band against the adhesive and to hold it there and means to release the package from the carriage upon the lapse of a predetermined time.

3. A machine for compressing and banding a stack of paper-like articles to form a package thereof which comprises a carriage movable between a receiving station

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and a sealing station, ram means movable toward the receiving station to move a stack of articles into the carriage, means to support a sheet of banding material in the path of said stack, means to clamp the stack and band in compressed condition in the carriage with ends of the band protruding, means to move the carriage to the sealing station, means to seal the ends of the band to complete a package, and means to release the clamping means to permit discharge of the package after completion of the sealing.

4. A machine for packaging paper bags or the like which comprises a ram to support and advance a stack of bags, means to position a sheet of banding material in the path of the advancing stack, a receptacle with an open side to receive the stack, and with walls to confine the stack and fold the band against the sides of the stack, advancement of the ram being effective to compress the stack in the receptacle, means including a pair of opposite clamping members cooperable with said walls and actuated by full advancement of the ram to retain the stack under compression upon retraction of the ram, means to secure the band around the compressed stack to form a package, and means to release the package from the receptacle.

5. A machine for packaging paper bags or the like which comprises a ram to support and advance a stack of bags, means to position a sheet of banding material in the path of the advancing stack, a receptacle with an open side to receive the stack, and with walls to confine the stack and fold the band against the sides of the stack, advancement of the ram being effective to compress the stack in the receptacle, means including a pair of opposite clamping members cooperable with said walls and actuated by full advancement of the ram to retain the stack under compression upon retraction of the ram with the ends of the band exposed, means to apply an adhesive to one exposed end, means to press the other exposed end against the adhesive for a predetermined time period, and means operable at the expiration of said period to move the retaining means to permit release of the banded stack.

6. A machine for banding paper bags or the like comprising a receiving station, a sealing station, a carriage movable between said stations and having a pair of spaced apart opposite walls, reciprocable ram means to advance and compress a stack of bags into the carriage at the receiving station, means to position a sheet of banding material in the path of said advancing stack, means including clamping members cooperable with said walls to hold the compressed stack and band in the carriage, means to move the carriage to the sealing station, means to apply an adhesive to the band during such movement, and means at the sealing station to apply sealing pressure to the band.

7. A machine for banding paper bags or the like comprising a receiving station, a sealing station, a carriage movable between said stations and having a pair of spaced apart opposite walls, reciprocable ram means to advance and compress a stack of bags into the carriage at the receiving station, means to position a sheet of banding material in the path of said advancing stack, means including clamping members cooperable with said walls to hold the compressed stack and band in the car-

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riage, means to move the carriage to the sealing station, means to apply an adhesive to the band during such movement, means at the sealing station to apply sealing pressure to the band, and means actuated upon arrival of the carriage at the sealing station to time the sealing pressure, release the banded stack and initiate return of the carriage to the receiving station.

8. A machine for banding paper bags or the like comprising a receiving station, a sealing station, a carriage movable between said stations, reciprocable ram means to advance and compress a stack of bags into the carriage at the receiving station, means to position a sheet of banding material in the path of said advancing stack, means to hold the compressed stack and band in the carriage, means to move the carriage to the sealing station, means to apply an adhesive to the band during such movement, means at the sealing station to apply sealing pressure to the band, time controlled means to release the stack and initiate return of the carriage, and means operable during return of the carriage to position another sheet of banding material for a subsequent banding cycle.

9. The machine defined in claim 8 in which manually operable actuating means is provided to initiate a cycle of said reciprocable ram means, and interlock means is provided to prevent movement of the ram means until the carriage has returned to the receiving station.

10. In a machine for compressing and banding a stack of paper bags or the like, a receptacle having a pair of opposite walls spaced apart to provide an opening therebetween at one end of the walls; means including a reciprocable ram to move such stack with a banding sheet partially about the stack, through said receptacle opening and between said opposite walls, and to compress the stack in said receptacle with ends of the sheet extending beyond said walls at said opening; and means including a pair of movably mounted opposite clamping members cooperable with said walls adjacent said opening for folding portions of said sheet ends against the stack and holding the stack in compressed state in the receptacle until the sheet ends are secured together.

11. In a machine for compressing and banding a stack of paper bags or the like, a receptacle having a pair of opposite walls spaced apart to provide an opening therebetween at one end of the walls; means including a reciprocable ram to move such stack with a banding sheet partially about the stack, through said receptacle opening and between said opposite walls, and to compress the stack in said receptacle with ends of the sheet extending beyond said walls at said opening; a pair of clamping members; means movably supporting each member adjacent a wall at said opening; and means connected to said clamping members actuatable by said ram when the ram has moved the stack into the receptacle for folding portions of said sheet ends against the stack and holding the stack in compressed state in the receptacle until the sheet ends are secured together.

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