ABSTRACT: Bag-handling apparatus by which bags received from a bag-making machine are stacked over bars, and means are provided for storing a number of stacked bars before unloading.
This invention relates to machines for handling plastics bags, and more particularly to apparatus for stacking and removing the completed bags from bagmaking machines.

In one method of removing the completed bags, used particularly for heavy-duty sacks received from the heat-sealing and severing station of machines for making sacks by heat-sealing and severing plastics tubular film at intervals of one sack length, the bags are fed successively to a bar over which they are hung one upon another until a folded stack of a desired number has been received upon the bar. The stack of sacks is then removed manually, usually to a packing station. This method has the advantage, over flat stacking methods, that the heat seals are allowed to cool without significant strain, since they are hanging free, and with less pressure upon them to cause them to stick one to another. It has the disadvantage that the machine needs constant attention, since only a limited number of sacks, perhaps 40 to 60, can be accommodated on the bar before being unloaded.

It is an object of the present invention to provide apparatus which allows bags stacked in such manner to be accommodated in greater numbers without attention.

The invention provides a bag-handling apparatus for receiving plastics bags from a bagmaking machine, the bags being hung at a bag-loading station over a horizontal stacking bar with their ends hanging downwards, for removal from the bar when a stack of sacks has accumulated, characterized in that the apparatus includes a plurality of such stacking bars, a storage magazine for the stacked bars, means for successively removing stacked bars with their loads from the loading station to the stacked bar storage magazine, and means for returning and successively feeding empty bars released from the stacked bar storage magazine to the bag-loading station.

The apparatus preferably comprises a plurality of bag-stacking bars each carrying at each end a rotatable or slidable support member, and a conveyor comprising paired tracks in parallel vertical planes following a pair of closed paths, for supporting and carrying the support members of the bag-stacking bars with the bars held horizontally, the paired conveyor tracks each including: a first downwardly inclined portion for receiving loaded bars from the bag-loading station and guiding them to a releasable gate at which bars may be unloaded from said bars, the tracks of said portion receiving the rotatable or slidable support members of said bars and allowing rolling or sliding movement thereof under gravity to said gate, and being of sufficient length to accommodate a plurality of loaded bars to provide a storage magazine therefor; a second inclined portion, above or beneath the first inclined portion, inclined in the opposite direction to the first inclined portion, of sufficient length to provide a storage magazine for the empty bars, for similarly receiving and allowing rolling or sliding movement of the bar support members thereon; a bar-turning portion located between said first and second inclined portions for raising or lowering bars received from said gate to the upper end of said second inclined portion; and a bar-exchanging portion, located between said second and first inclined portions, for releasing a stacked bar from the loading station to the first inclined portion and for simultaneously raising or lowering an empty bar from the lower end of the empty bar magazine to the loading station.

The said second inclined portion, or empty bar magazine, of the conveyor is preferably beneath the first inclined portion, or loaded bar magazine; the said bar turning portion is then preferably adapted to be driven at least in part by the weight of a bar received from the releasable gate at the unloading station. The bar exchanging portion may be driven by external means.

One preferred form of the apparatus of the invention will now be described by way of example with reference to the accompanying drawings, which show such preferred apparatus used in conjunction with a heavy-duty sack-making machine, and of which:

FIG. 1 is a diagram of part of the apparatus including the bag-loading station, seen from the side;
The bar-turning mechanism, shown in FIG. 4, comprises a pair of rotatable wheels, 17, formed by a number of circular rubber discs, 18, sandwiched between and under compression from a pair of circular metal flanges, 19, of smaller diameter than the rubber discs, the edges of which thus project beyond the edges of the metal flanges. Two semicircular outer guide tracks, 20, are positioned inwardly of the wheels, 17, the upper ends being opposite the end of the rails 6, and the lower ends leading on to the rails 7; opposite the tracks 20 are semicircular inner guide tracks, 21. At 22 is provided a releasable gate which allows only one bar to pass at any one time, and which holds the stacked bars on the rails 6 until unloading of the sacks begins. When a loaded bar is pulled through the gate, the ends of the bars, 4, are brought into contact with the compressible rubber discs of the wheels 17, which on rotation cause the wheels, 3, on the bars to be held against the outer semicircular tracks 19, so that the bar is carried round the tracks and released on to the rails, 7, of the empty bar storage magazine. The rotation of the wheels 17 is begun by the forward pressure exerted when each stack of sacks is manually drawn off its stacker bar, and is completed by the weight of the bar as it is carried downwards between the wheels 17 and semicircular tracks 19. A brake 23 (FIG. 4) is provided for controlling the speed of rotation of the wheels 17 during the unloading and bar-returning process.

In operation of the device, each sack is passed out of the sack machine drawhead base first, and then it has been fed out to its full length the leading half has become draped over a bar which is already in position at the loading station. The rear half lies on the table, 10, of the flapping device. As the sealing and gullotining occurs to make the sack, this table moves down around the pivot, and, with the bar 11, flaps the rear half of the sack over the bar. The table then returns to the horizontal position, and the operation is repeated until the sack is complete. The number of sacks so stacked in one pile is predetermined, and is controlled by means of an electromechanical counter which, on completion of the stack, activates the bar exchange mechanism, which transfers the stacked bar to the stacked bar storage magazine and replaces it by an empty bar. The speed of the operation is such as to ensure that no sacks are dropped during the bar changing period.

The bar containing the stack of sacks rolls down the inclined rails 6 of the storage magazine, where it is stored and subsequently joined by other fully stacked bars. When, or before, the maximum number of fully stacked bars has been received, the gate 22 is released to allow the leading bar to pass through, and its stack of sacks is manually removed, causing the bar to be carried round to the empty bar storage magazine, as above described. This operation is repeated until all the stacked bars have been unloaded.

The apparatus of the present invention allows the sack maker to operate, without unloading the sacks, for a much longer period than has hitherto been possible with machines of this type. Much of the unloading operator's time is thus saved, and a number of machines can be tended by a single operator. Further advantages are that each sack is precisely positioned, and the stacks produced are very neat and may be directly packed without realignment or typing. The bar return and bar exchange mechanisms operate with very low mechanical wear.

While the apparatus has been described, and is particularly useful, for the removal and storage of bags made by transversely heat-sealing and severing lengths of plastics tubular film, it may be used in any bagmaking operation in which bags pass successively out of the bag maker in the direction of their longitudinal axis. The apparatus may be used, for example, for stacking sacks made by stitching a stitched bottom seams made from lengths of tubular fabric woven from polypropylene or polythene tapes, or sacks similarly made from lengths of tubular plastics film by stitching.

1. A bag-handling apparatus for receiving flexible bags from a bagmaking machine, said apparatus comprising a bag-loading station, a plurality of horizontal stacking bars for stacking bags at said station, movable means operatively associated with the delivery of bags from said bagmaking machine for draping bags delivered from said machine across said horizontal stacking bars to provide a stack of bags thereon with the bags hanging downwards for removal from the bar when a stack of bags has accumulated thereon, said apparatus further including a storage magazine for the stacked bars, conveyor means for successively removing stacked bars with their loads from the loading station to the stacked bar storage magazine, and conveyor means for returning and successively feeding empty bars released from the stacked bar storage magazine to the bag loading station.

2. An apparatus as claimed in claim 1 that comprises a plurality of bag-stacking bars each carrying at each end a rotatable or slidable support member, and a conveyor comprising a pair of parallel tracks running in parallel vertical planes forming a pair of closed paths, for supporting and carrying the support members of the bag-stacking bars with the bars held horizontally, the pair of conveyor tracks each including: a first downwards inclined portion for receiving loaded bars from the bag-loading station and guiding them to a releasable gate at which bags may be unloaded from said bars, the tracks of said portion receiving the rotatable or slidable support members of said bars and allowing rolling or sliding movement thereof under gravity to said gate, and being of sufficient length to accommodate a plurality of loaded bars to provide a storage magazine therefor; a second inclined portion, above or beneath the first inclined portion and inclined in the opposite direction, sufficient length to provide a storage magazine for the empty bars, for similarly receiving and allowing rolling or sliding movement of the bar support members thereon; a bar turning portion located between said first and second inclined portions for raising or lowering bars received from said gate to the upper end of said second inclined portion; and a bar exchanging portion, located between said second and first inclined portions, for releasing a stacked bar from the loading station to the first inclined portion and for simultaneously raising or lowering an empty bar from the lower end of the empty bar magazine to the loading station.

3. An apparatus as claimed in claim 2 in which said second inclined portion of the paired conveyor tracks is beneath the first inclined portion.

4. An apparatus as claimed in claim 3 in which the bar-turning portion is driven at least in part by the weight of a bar received from the releasable gate at the unloading station.