APPARATUS FOR ASSEMBLING PILES OF PRINTED SIGNATURES INTO BATCHES

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ABSTRACT
An apparatus for assembling piles of newspapers and the like, comprising a pile-advancing rollerway and a pair of shafts extending at both sides of this rollerway and carrying a pair of oppositely arranged S-shaped levers defining therebetwixt a pile assembling zone. The shafts are driven for opposite timed rotation, so that the arms of the levers pass through the space intermediate of the rollers of the rollerways, move toward each other and overlap to raise a pile and to hold it in the assembling zone, whereafter the arms spread apart to lower the pile onto the successive pile, so that a batch is formed. A pair of drums is mounted in advance of the assembling zone longitudinally of the rollerway to guide a pile into the zone; mounted in this assembling zone, in front of the S-shaped levers, are vertically extending driven rollers adapted to effect positive levelling of the lateral sides of the pile. The provision of the drums and of the driven rollers prevent displacement and skewing of a pile relative to the longitudinal axis of the rollerway, thus providing high quality batches assembled from the piles.

4 Claims, 5 Drawing Figures
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BACKGROUND OF THE INVENTION

The invention presents a further improvement of the apparatus disclosed in the co-pending application Ser. No. 343,163 filed Mar. 3, 1973, now U.S. Pat. No. 3,831,781, and, more particularly, it relates to an apparatus for assembling piles of printed signatures into batches.

The present invention can be used to utmost advantage for assembling piles of folded newspapers into multi-pile batches.

In the present disclosure, the expression “a pile of printed signatures” is used to describe an arbitrary number of printed signatures, e.g. newspapers placed one on top of another and aligned so that all the cross folds of the signatures are facing in the same direction.

The expression “a batch of printed signatures” is meant to describe an assembly of piles placed one on top of another, with the cross folds of successive piles alternating in the batch, i.e. the folds of an adjacent pair of piles in the batch facing in the opposite directions.

The above-specified pattern of assembling piles into multi-pile batches prevents the batches from crumbling as they are advanced for successive handling, e.g. for packaging.

In the above-mentioned previously filed co-pending Application an apparatus is described for assembling piles of newspapers into batches, comprising a rollerway for advancing piles of newspapers, the rollers of this rollerway being mounted so that the ends thereof are free, a pair of shafts extending at the opposite sides of this rollerway longitudinally thereof, the shafts carrying a pair of oppositely mounted S-shaped levers defining therebetween a pile assembling zone. The shafts are driven for timed opposing rotation so that the arms of these levers pass through a space intermediate of the free ends of the rollers of the rollerway and then move toward each other and partly overlap to raise a pile which has been advanced into the assembling zone and to hold this pile, wherewith the arms are spread apart by continuing rotation of the shafts to lower the pile onto a successive pile advanced by the rollerway, so that a batch is formed.

The abovedescribed apparatus ensures reliable and stable assembling of piles into batches, provided for by the operation of the S-shaped levers. However, in this apparatus a pile may fail to reach the assembling zone. This might occur on account of the fact that the pile is advanced by the rollerway in a somewhat arbitrary manner, i.e. the pile may either be displaced with respect to the longitudinal axis of the rollerway, or else it might be skewed relative thereto, or both, whereby the advanced pile may then abut against one of the levers.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an apparatus for assembling piles of printed signatures into batches, that provides for a high quality assembling operation.

It is an important object of the present invention to provide an apparatus which prevents skewing and displacement of piles with respect to the longitudinal axis of the rollerway.

It is still another object of the present invention to provide an apparatus preventing friction of the signatures against the S-shaped levers defining the assembling zone.

These and other objects are attained in an apparatus for assembling piles of printed signatures into batches, comprising a rollerway for advancing the piles, the rollers of this rollerway being mounted so that the ends of these rollers are free, a pair of shafts extending along this rollerway at both sides thereof, the shafts carrying a pair of S-shaped levers mounted in opposition to each other and defining therebetween a pile assembling zone. The shafts are associated with drive means effecting timed opposing rotation thereof, so that the arms of the levers pass through a space intermediate of the free ends of the rollers of the rollerway, wherewith the arms move toward each other and partly overlap to raise a pile advanced by the rollerway into the assembling zone and to hold this pile in this zone. Continuing rotation of the shafts then spread the arms apart to lower the pile onto a successive pile advanced by the rollerway into the assembling zone, so that a batch is formed, which apparatus, in accordance with the present invention, further comprises a pair of drums mounted on driven arbors and arranged in advance of the assembling zone longitudinally of the rollerway at both sides thereof, these drums being adapted to guide a pile into the assembling zone mounted within the assembling zone in front of the S-shaped levers is a plurality of vertically extending driven rollers forming two parallel vertical arrays, the last-mentioned rollers being adapted to effect positive levelling of the lateral sides of a pile, as the latter is advanced by the rollerway into the assembling zone. The provision of the drums prevents skewing and displacement of the piles relative to the longitudinal axis of the rollerway, since a displaced or skewed pile is bound to engage one of the drums, to be aligned by the rotation of the drum with the longitudinal axis of the rollerway, whereby the pile is properly indexed, as it enters the assembling zone. Furthermore, the provision in the assembling zone itself of vertically arranged driven rollers likewise prevents skewing or displacement of the piles relative to the longitudinal axis of the rollerway, the last-mentioned rollers also effecting levelling of the sides of the piles, the pile permanently engaging the rollers to prevent collapse thereof, i.e. the rollers act as the guides of a pile in the assembling zone.

To simplify the structure of the apparatus and to facilitate maintenance, it is preferable that the driven arbors of the drums and the vertically arranged rollers receive rotation from the rollers of the rollerway. This is preferably attained by bevelling the free ends of the rollers of the rollerway, one end of the driven arbor of each one of the drums also being bevelled for cooperation with the beveled end of a corresponding one of the rollers of the rollerway, while each one of the vertically arranged rollers one of its ends journalled in a bracket, whereas the opposite end of this roller is bevelled for cooperation with the beveled end of the respective roller of the rollerway, whereby in operation the two drums are rotated in opposite directions, and the vertical rollers are rotated in the direction of rotation of the rollers of the rollerway.

When piles of printed signatures, e.g. newspapers are assembled into batches by the S-shaped levers, there is the possibility that the bottommost newspaper in the
pile might be displaced on account of friction against the levers. This displacement impedes further assembling of batches and affects the quality of the assembled batches. Furthermore, friction against the levers might affect the appearance of the newspaper. To prevent this eventually, it is advisable that each of the S-shaped levers include a pair of parallel S-shaped plates interconnected by a common spindle having mounted thereon freely rotatable roller means minimizing friction between the bottom plane of the pile and the levers. The rollers are preferably made of a material displaying oleophobic properties.

BRIEF DESCRIPTION OF THE DRAWINGS

So that the present invention may be better understood, given hereinafter is a detailed description of an embodiment of the invention, with reference being had to the accompanying drawings wherein:

FIG. 1 is a side elevation of an apparatus for assembling piles of printed signatures into batches in accordance with the invention;

FIG. 2 is a sectional view along line II—II of FIG. 1;

FIG. 3 is a sectional view along line III—III of FIG. 1;

FIG. 4 is a sectional view along line IV—IV of FIG. 1;

FIG. 5 is a sectional view along line V—V in FIG. 2.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now in particular to the appended drawings, the apparatus of the invention includes a rollerway 1 (FIG. 1) for advancing successive piles 2 of newspapers, the rollers 3 of this rollerway being mounted so that the ends of the rollers are free and a space 4 is left intermediate these ends of the rollers 3. At both sides of the rollerway 1, longitudinally thereof, a pair of shafts 5 (FIG. 2) for carrying a respective pair of opposing S-shaped levers 6 is mounted defining therebetween an assembling zone for assembling piles 2 advanced by the rollerway 1. The shafts 5 are driven for timed rotation in opposing directions through a gear train 7 (FIG. 1) from a drive of any known structure suitable for the purpose. Furthermore, the drive system includes a mechanism for positively arresting the shafts 5 in two specified angular positions, which mechanism is described in detail in the abovementioned copending application. One of the two positions corresponds to the shafts having been turned together with the levers 6 through 180°, during which rotation the arms pass through the space 4 intermediate the free ends of the rollers 3, move toward each other to partly overlap and lift the pile that has been advanced by the rollerway into the pile assembling zone, in which position the arms hold the pile within this zone. The other position corresponds to the shafts 5 having been turned through an angle sufficient for the arms to be spread apart and to lower the pile held thereby onto a successive pile advanced by the rollerway 1, so that a batch is formed.

The rollers 3 (FIG. 1) of the rollerway are rotated by the sprockets 8 fixed on the respective spindles of the rollers 3, the sprockets 8 being connected through a driving chain 9 to sprockets 10 journalled in the framework 11 of the apparatus. One of the sprockets 10 is connected through a driving chain 12 to a driving sprocket 13 also journalled in the framework 11 of the apparatus.

To prevent skewing and displacement of piles 2 relative to the longitudinal axis of the rollerway 1, two drums 14 supported on driven arbors 15 are mounted in advance of the assembling zone along both sides of the rollerway, respectively, (FIG. 3). The arbors receive rotation from the rollers 3 of the rollerway 1 by one end 16 of each arbor being beveled and cooperating with the free end 17 of a corresponding one of the rollers 3 of the rollerway 1, which free end is likewise beveled. With the arbors 15 of the drums 14 being driven in this manner, the drums are synchronously rotated in opposing directions, corresponding to that of rotation of the rollers 3.

In the assembling itself the piles may also become skewed and displaced relative to the longitudinal axis of the rollerway; newspapers in a pile may also become displaced relative to one another. To prevent this, it is essential that the lateral sides of the piles are positively levelled out. Therefore, mounted in the assembling zone in front of the S-shaped levers 6 (FIG. 2) are extending driven rollers 18 forming two parallel arrays and performing positive levelling of the lateral sides of the piles. The rollers 18 are rotated by the rollers 3 of the rollerway 1, one end of each roller 18 being journalled by its spindle 19 (FIG. 4) in a bracket 20, the opposite free end 21 of each roller 18 being beveled and cooperating with the free beveled end 17 of a corresponding one of the rollers 3 of the rollerway 1. This driving pattern provides for opposing rotation of the two arrays of the rollers 18, corresponding to the direction of rotation of the rollers 3 of the rollerway 1.

To prevent friction of the bottommost newspaper in a pile 2 against the levers 6, the latter are each made in the form of a pair of parallel S-shaped plates 22 (FIG. 5) interconnected by a spindle 23 having rollers 24 freely rotatably mounted thereon and made of a material displaying oleophobic properties, the rollers minimizing friction of the bottommost newspaper in the pile against the levers 6.

Operation of the apparatus

When the drive (not shown) of the herein disclosed apparatus is energized, the rollers 3 of the rollerway receive rotation through a driving train formed by the abovespecified elements 8, 9, 10, 12 and 13, whereas the shafts 5 with the S-shaped levers 6 are rotated through gear trains 7.

Thus, a pile 2 of newspapers on the rollerway 1 is being advanced twoward the assembling zone defined by the S-shaped levers 6. Since the shafts 5 are rotated together with the levers 6, the latter engage the pile from below, lift it off the rollerway and hold it above the assembling zone until a successive pile 2 is advanced into the assembling zone.

As the shafts 5 continue to rotate the pile-supporting arms of the levers 6 are spread apart, whereby the pile 2 which has been held by the arms of the levers is placed on top of the new pile, so that a batch is formed. The operation of assembling piles into batches and delivery of the assembled batches from the assembling zone are described in detail in the abovementioned copending application and thus are not described in detail here.

However, as a pile 2 is being advanced by the rollerway 1, the pile may become skewed or displaced rela-
tive to the longitudinal axis of the rollerway, so that the pile abuts against either one of the two drums 14.

Since the beveled end 16 of the arbor 15 of each drum 14 cooperate with the beveled free end 17 of the respective roller 3, the drums 14 are rotated in directions corresponding to that of rotation of the rollers 3. This rotation of the drums ensures that a displaced or skewed pile is aligned with respect to the longitudinal axis of the rollerway 1 and is accurately guided into the assembling zone.

Within the assembling zone itself a pile may also become displaced and/or skewed relative to the longitudinal axis of the rollerway, to thereby impede the assembling operation, since in this case the skewed or displaced pile abuts into either one of the S-shaped levers 6. However, with the vertically extending rollers 18 being mounted in two arrays in front of the respective levers 6, and the beveled ends 21 of the rollers 18 cooperating with the beveled ends 17 of the rotating rollers 3 of the rollerway, the displaced pile has its lateral sides levelled by these rotating rollers 18, and the operation of assembling a batch is normalized.

The freely rotatable rollers 24 minimize friction of the bottommost newspapers in a pile 2 against the levers 6, whereby appearance of the pile is not affected.

What is claimed is:

1. An apparatus for assembling piles of printed signatures into batches, comprising: a rollerway for advancing the piles, and having a plurality of rollers mounted so that the ends thereof are free to thereby define a plurality of spaces respectively between each adjacent one of said rollers; two rotatably mounted shafts extending longitudinally of said rollerway one at each side thereof; a pair of S-shaped levers having arms and mounted in opposition to each other on said shafts and defining therebetween a zone for assembling the piles successively advanced by said rollerway, said shafts being arranged for timed rotation in opposite directions so that the arms of said levers pass through said plurality of spaces and move toward each other and overlap, whereby a pile advanced into said assembling zone is lifted by the arms of said shafts and is held in said zone and continuing rotation of said shafts causes said arms to spread apart to lower said pile onto a succeeding pile advanced by said rollerway so as to form a batch; two driven arbors respectively arranged longitudinally of said rollerway at both sides thereof in advance of said assembling zone; a rotatable drum mounted on each of said two driven arbors for guiding a pile of printed signatures into said assembling zone; a plurality of driven rollers arranged in said assembling zone in front of said S-shaped levers, said driven rollers extending vertically and forming two parallel arrays for effecting positive levelling of the lateral sides of a pile of printed signatures, as the latter is being advanced in said assembling zone by said rollerway.

2. An apparatus as claimed in claim 1, wherein at least one of the rollers of said rollerway have said free ends beveled, each one of said driven arbors having a bevelled end thereof for driving cooperation with said bevelled free end of a respective one of said rollers of said rollerway; a bracket; a spindle journaled in said bracket each one of said driven rollers having one end thereof supported by said bracket and having the opposite end thereof bevelled for driving cooperation with the bevelled end of a respective one of the rollers of said rollerway, whereby said driven rollers rotate in opposite directions corresponding to the direction of rotation of the rollers of said rollerway.

3. An apparatus as claimed in claim 1, wherein each said S-shaped lever includes a pair of parallel S-shaped plates; at least one spindle secured in said plates; roller means mounted for free rotation on said spindle to minimize friction between the bottom plane of a pile of printed signature and said levers.

4. An apparatus as claimed in claim 3, wherein said roller means minimizing friction between the bottom plane of a pile and said levers is made of a material having oleophobic properties.