INTERLEAVING DEVICE FOR A DUPLICATING MACHINE

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6 Sheets-Sheet 1

FIG. 1

FIG. 5

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This invention relates to an interleaving device and more especially to an interleaving device for a duplicating machine.

Although it is not so limited, the invention will, for convenience, be described hereinafter with reference to its use on a twin cylinder duplicating machine of the type in which a stencil carrier assembly travels around a top and bottom cylinder and sheets of paper are fed in succession between the bottom cylinder and a pressure roller which presses the sheets against a stencil carried by the said assembly, the sheets being delivered from between the bottom cylinder and the pressure roller to a receiving tray to build up a stack of copies thereon. The pressure roller is periodically moved towards the bottom cylinder, so as to apply printing pressure to the said sheets, and away from the bottom cylinder, so as to release said pressure and so as to clear projections on the stencil carrier assembly. The copies so delivered are caused to fall onto the receiving tray by their hitting a back stacking fence mounted on the receiving tray. The position of the back stacking fence on the receiving tray is adjustable so as to accommodate sheets of different length, e.g. foolscap and quarto sheets. Thus the back stacking fence may be provided with a shoe movable in a slot extending longitudinally of the receiving tray.

In order to prevent set-off between the individual copies of the stack while the ink on these copies is still wet, it is known to interleave the said copies, as they fall onto the receiving tray, with cards having some degree of absorbency for the ink.

It will be appreciated that if a duplicating machine of the said type were provided with an interleaving device which was adapted for use with cards of one length (e.g. foolscap) only, and it was desired to duplicate sheets of a different length (e.g. quarto) the back stacking fence would have to be adjusted to a position such that both the cards and the sheets would be accommodated on the receiving tray. That is to say the back stacking fence would have to be adjusted to a position corresponding to the length of either the sheets or of the cards, whichever was the greater. The result would be that a newly arranged stack of sheets and cards would not be built up on the receiving tray.

It is therefore the object of the invention to provide an interleaving device adapted for use with cards of different lengths, so that cards may be used whose length is the same as that of the sheets to be duplicated, whereby the back stacking fence may be adjusted to a position corresponding to said length and a neatly arranged stack will be built up on the receiving tray.

According to the invention there is provided an interleaving device adapted for use with cards of different lengths comprising a box-like main frame open at the bottom and having card support means, the main frame being adapted to rest on each stack of cards to be supported on said support means; a secondary frame mounted in said main frame so as to constitute an end wall thereof and movable to a plurality of spaced positions in said main frame whereby to accommodate cards of different lengths; means for retaining the secondary frame in each of said spaced positions; a card engaging slide mounted on said secondary frame so that movement of said slide effects horizontal movement of the lowest card of the stack; means for preventing movement of the other cards of the stack when the said slide is moved; and means operable when the secondary frame is in any of the said spaced positions, for moving the slide so that the lowest card is moved from a position in which it is supported by the card support means to a position in which it is allowed to fall through the open bottom of the main frame.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:

Fig. 1 is a perspective view of a first embodiment of an interleaving device according to the invention.

Figs. 2 and 3 are respectively a longitudinal section and a broken away front elevation of the said first embodiment.

Fig. 4 is a rear elevation of a part of the first embodiment.

Fig. 5 is a broken away perspective view of another part of the first embodiment.

Figs. 6 and 7 are plan views of cards adapted for use with the said first embodiment.

Fig. 8 is a section on the line VIII—VIII of Fig. 7.

Fig. 9 is a perspective view of a second and preferred embodiment of an interleaving device according to the invention.

Figs. 10 to 12 are respectively a longitudinal section, a broken away front elevation, and a rear elevation of the second embodiment, and

Fig. 13 is a plan view of a card adapted for use with the second embodiment.

Referring first to Figs. 1 to 5, an interleaving device for a duplicating machine of the said type comprises a box-like main frame open at the bottom, the main frame being constituted by a pair of spaced parallel plates 1, 2 which are welded or otherwise secured to pairs of cross bars 3, 4. The main frame is adapted to be set above the receiving tray (not shown) of the duplicating machine in a readily removable manner by means of spaced supports 5 which are secured to the cross bars 3. Mounted on the plate 1 for reciprocating motion longitudinally thereof is a slide 6 whose upper surface is formed with a pair of spaced horizontally spaced notches. Pivotally secured to the slide 6 is a link 8 which is adapted to be removable secured to the pressure frame of the duplicating machine (i.e. to the frame carrying the pressure roller) or to any other part of the duplicating machine which will impart one complete to and fro reciprocation of the link 8 for each complete printing cycle of the machine.

The plates 1, 2 are provided with aligned slots 9 whose central portions extend longitudinally of the said plates. The slots 9 have end portions 10, 11 which extend transversely of the said plates and which are disposed vertically below the notches 7.

Mounted on the main frame so as to constitute an end wall thereof is a secondary frame 12. Secured to either side of and adjacent the base of the secondary frame 12 is a stub shaft 13, a hand knob 14 being screwed onto each stub shaft 13. The secondary frame 12 is also provided with a pair of studs 15 which are disposed vertically above the stub shafts 13, each stud 15 being adapted to be retained in a pair of spaced notches 16, 17 in the plates 1, 2, the said notches being disposed vertically above the end portions 10, 11 respectively of the slots 9. The stub shafts 13 extend through the slots 9, the secondary frame 12 being movable by the hand knobs 14 from the position illustrated in Fig. 1, in which
the stub shafts 13 are retained in the end portions 11 of the slots 9 and the studs 15 are retained in the notches 17, to a forward position, in which the stub shafts 13 are retained in the end portion 10 of the slots 9 and the studs 15 are retained in the notches 16.

Rotatably mounted in the secondary frame 12 is a shaft 18. A strip is provided at one end with a downwardly extending arm 19 at the bottom end of which is mounted an inwardly projecting pin 20 which is adapted to be retained in either notch 7. Welded or otherwise secured to the shaft 18 is a downwardly extending strap 21 whose lower end passes through a slot 22' in a slide 22, the slide being mounted in guides 23 secured to the bottom of the secondary frame 12. Accordingly, when the secondary frame 12 is either in the position shown in Fig. 1 or in the said forward position, the pin 20 being retained in the appropriate notch 7, reciprocation of the link 8 will cause corresponding reciprocation of the slide 22, and hence oscillation of the arm 19 and reciprocation of the slide 22.

Mounted on the side 24 of the secondary frame 12 which faces the duplicating machine is a projection 25 whose base is disposed above and slightly spaced apart from the cross bars 3. The cross bars 3 are provided with a pair of spaced metal strips 26 each of which has a downwardly sloping end portion 27. The plate 2 is provided, adjacent its bottom, with three spaced apart inwardly projecting pins 28, the plate 1 being provided with similar pins 28' aligned therewith.

The interleaving device of Figs. 1–5 is adapted for use with cards 29 or 30 of ink-absorbent material (see Figs. 6–8) and the cards 29, 30 may be respectively of foolscap and quarto size. When the cards 29 are being used, the secondary frame 12 is placed in the position shown in Fig. 1, while when the cards 30 are being used the secondary frame 12 is placed in the said forward position.

Each card 29, 30 is provided at opposite ends with similarly shaped slots 31, 32 so that the cards may be placed over the projection 25 to rest on the slide 22 by passing the slots 31 or 33, as the case may be, over the said projection. Each edge of the cards 29, 30 is provided with three spaced apart slots 33 whose spacing corresponds to that of the pins 28, 28', the slots 33 being, however, very much wider than the said pins. The cards 29, 30 are also provided with cut-outs so as to reduce air resistance when the cards fall into the receiving tray as hereinafter described.

The operation of the interleaving device of Figs. 1 to 5 will now be described, it being assumed that foolscap sheets are being passed through the duplicating machine and that it will therefore be necessary to use the cards 29. The secondary frame 12 is accordingly placed in the position shown in Fig. 1 and a stack of cards 29 is placed on the slide 22 by passing the slots 31 in the cards 29 over the projection 25. In this position, the slots 33 will be out of register with the pins 28, 28' whereby the stack will be supported by the said pins.

When duplicating starts, the link 8 is moved through one complete reciprocation for each complete revolution of the cylinders of the duplicating machine and during the movement of the link 8 towards the duplicating machine (i.e. towards the right as seen in Fig. 1) the slide 22 will move correspondingly towards the right. The slide 22 is formed with a small step 35 (Fig. 5) and, as the slide 22 moves towards the right, the lowest part of the frame is engaged by the step 35 and is moved to a position in which the pins 28 are centrally disposed within the slots 33 and the righthand end of the said card is supported by the strips 26. The lowest part of the frame is capable of being moved in this manner from below the projection 25 by virtue of the spacing between the said projection and the slide 22. The bottom of the projection 25, however, is sufficiently close to the slide 22 to prevent movement of the remaining cards of the stack.

As the link 8 moves away from the duplicating machine (i.e., towards the left as seen in Fig. 1), the slide 22 is gradually removed from below the card. The card is temporarily held by the strips 26 but will eventually slide off the sloping end portions 27 thereof so as to fall through the bottom of the main frame and into the receiving tray. This ensures that the righthand end of the card touches the stack of material in the receiving tray after the lefthand end has done so with the result that the card does not interfere with the delivery of duplicated sheets from the duplicating machine into the receiving tray. It is arranged that the card is shown in Fig. 1 after a freshly printed sheet has been delivered into the receiving tray.

Referring now to Figs. 9 to 12 which illustrate a second and preferred embodiment of the invention, an interleaving device for a duplicating machine of the said type comprises a box-like main frame 40 open at the bottom. The main frame comprises a pair of spaced parallel plates 41, 42 which are connected together at one end by a pair of cross bars 43, and are connected together at the other end by a strap 44. The main frame 40 is adapted to be mounted above the receiving tray (not shown) in the duplicating machine in a readily removable manner by means of spaced supports 45 which are secured to the cross bars 43.

Mounted on the plate 41 for reciprocating motion longitudinally thereof is a slide 46 which is provided with two horizontally spaced apart outwardly extending pins or studs 47, 48 whose purpose is discussed below. The slide 46 is pivotally secured to a link 49 which is adapted to be removable secured to the pressure frame of the duplicating machine or to any other part of the duplicating machine which will impart one complete to and fro reciprocation of the link 49 for each complete printing cycle of the machine.

The internal face of the plate 41 is provided with two vertically extending guide members 50, 51 which are spaced apart by a distance equal to the spacing between the pins or studs 47, 48. The plate 42 is similarly provided with vertically extending guide members 50', 51' which are aligned with the guide members 50, 51.

Mounted in the main frame 40 so as to constitute an end wall thereof is a secondary frame 52. The secondary frame 52 is shown in Fig. 9 as being mounted in the duplicating machine so as to position the guide members 50, 50'. The secondary frame 52 may, however, be readily be lifted from the position shown in Fig. 9 and placed in the guide members 51, 51', as indicated by faint lines in Figs. 10 and 11. Rotatably mounted in the secondary frame 52 is a shaft 53 to one end of which is secured an arm or plate 54 in whose bottom surface is formed a notch 55 which is engageable with either of the pins or studs 47, 48. Welded or otherwise secured to the shaft 53 is a downwardly extending strap 56 whose lower end passes through a slot 57 in a slide 58, the slide being mounted in guides 59 secured to the bottom of the secondary frame 52. The end of the slide 58 facing the duplicating machine is formed with a step 60. It will be appreciated that when the secondary frame 52 is in either of the positions indicated in Figs. 10 and 11 reciprocation of the link 49 will effect reciprocation of the slide 58. Mounted on the side 61 of the secondary frame 52 which faces the duplicating machine is a projection 62 whose base is disposed above and slightly spaced apart from the slide 58. To either side of the projection 62 is a lever 63 which is pivotally mounted in the respective guide 59 of the weight of the lever causes it to be inclined upwardly towards the duplicating machine. To this end, the levers 63 are pivoted at points remote from their centers of gravity.

The cross bars 43 are provided with a pair of spaced metal strips 64 each of which has a downwardly sloping end portion 65. The plate 42 is provided, adjacent its bottom, with three spaced apart inwardly projecting
pins 66, the plate 41 being provided with similar pins 66' aligned therewith.

The interleaving device of Figs. 9 to 11 is adapted for use with ink-absorbent cards 67 (see Fig. 13) which may be of foilspar or quarto size. Fig. 13 illustrates a foilspar card 67 having similar end portions 67' and a central portion 67". The quarto card 67 (not shown) differs from the foilspar card illustrated in Fig. 13 only in that the quarto card does not have a central portion 67". Each end portion 67' is provided with a slot 68 by means of which the card 67 may be placed over the projection 62 so as to rest on the slide 58. The upper and lower end of each portion of the card is provided with outwardly tapering edges which meet at apices 69, the spacing between the apices 69 at each end of the card being the same as the spacing between the pins 66 and 66'. The cards 67 are also provided with cut- outs 70 so as to reduce air resistance when the cards fall into the receiving tray.

The operation of the interleaving device of Figs. 9 to 12 is substantially the same as that of the device of Figs. 1 to 5 and will not therefore be described in detail. Suffice it to say that the secondary frame 52 is placed in the main frame 40 in a position corresponding to the length of the cards 67 being used and that a stack of these cards is inserted in the main frame 40 over the projection 62. In this position, the apices 69 will be supported by the pins 66, 66'. When the link 49 is moved towards the duplicating machine (i.e. towards the right as seen in Fig. 1) the lowermost card of the stack is engaged by the step 60 of the slide 58 and is moved thereto at the bottom; a plurality of stationary spaced card support means projecting inwardly of said main frame and adapted to support a stack of cards; a secondary frame mounted in said main frame so as to constitute an end wall thereof and positionable in a plurality of fixed spaced positions in said main frame whereby to accommodate cards of different lengths; means for retaining the secondary frame in each of said spaced positions; a horizontally movable card-engaging slide mounted in said secondary frame; a support member having a downwardly sloping end portion, said support member being secured to that end of the main frame opposite the secondary frame, horizontal movement of the slide in one direction causing the lowest card of the stack to move horizontally to a position in which it is supported by the card support means whereby it is no longer supported by the card support means, but in which one end of the card is supported by said support member while the other end of the card is supported by the slide, and subsequent movement of the slide against the opposite end of the slide from said other end of the card whereby the card slips out of said downwardly sloping end portion; card holding means carried by said device cooperating with a notch in said cards, said card holding means being operative to successively release the lowest card of a stack of cards disposed in said main frame as successive cards are removed from the bottom of said stack by said slide; a reciprocating member mounted on the main frame for reciprocating movement longitudinally thereof; and means connected to the slide and carried by the secondary frame, said means being engageable with the reciprocating member when the secondary frame is in any of the said spaced positions.

I claim:

1. An interleaving device for use with notched cards of different lengths comprising a box-like main frame open at the bottom; a plurality of stationary spaced card support means projecting inwardly of said main frame and adapted to support a stack of cards; a secondary frame mounted in said main frame so as to constitute an end wall thereof and positionable in a plurality of fixed spaced positions in said main frame whereby to accommodate cards of different lengths; means for retaining the secondary frame in each of said spaced positions; a horizontally movable card-engaging slide mounted in said secondary frame and adapted to engage and move the lowest card of said stack to a position in which notches in the lowermost card align with said card support means whereby it is no longer supported by the card support means, but in which one end of the card is supported by said support member while the other end of the card is supported by the slide, and subsequent movement of the slide in the opposite direction removing the slide from said other end of the card whereby the card slips out of said downwardly sloping end portion; card holding means carried by said device cooperating with a notch in said cards, said card holding means being operative to successively release the lowest card of a stack of cards disposed in said main frame as successive cards are removed from the bottom of said stack by said slide; a shaft rotatably mounted in the secondary frame and connected to the slide; an arm carried by said shaft; and a reciprocating member mounted on the main frame for reciprocating motion longitudinally thereof, said arm being engageable with the reciprocating
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An interleaving device as claimed in claim 5 in which a plurality of horizontally spaced outwardly extending pins are mounted on said reciprocating member and the arm is provided with a notch engageable with said pin.

7. An interleaving device as claimed in claim 5 in which a pin is mounted on the arm and in which the reciprocating member is provided with horizontally spaced notches engageable with said pin.

8. An interleaving device for use with notched cards of different lengths comprising a box-like main frame open at the bottom; a plurality of stationary spaced card support means projecting inwardly of said main frame and adapted to support a stack of cards; a secondary frame mounted in said main frame so as to constitute an end wall thereof and positionable in a plurality of fixed spaced positions in said main frame whereby to accommodate cards of different lengths; means for retaining the secondary frame in each of said spaced positions; a horizontally movable card-engaging slide mounted in said secondary frame; a support member having a downwardly sloping end portion, said support member being secured to said slide; means, operable when the secondary frame is in any of the said spaced positions, for moving the slide; and means for preventing the lowermost card, after it has been moved in one direction by the slide, from being moved in the opposite direction.

9. An interleaving device as claimed in claim 8 in which the means for preventing the lowermost card from being moved in the opposite direction comprises at least one abutment member carried by the secondary frame and urged into an inclined position, the lowermost card being movable by the slide over the upper end of said member.

10. An interleaving device as claimed in claim 5 in which the means for preventing the lowermost card being moved in the said opposite direction comprises at least one abutment member secured to and urged into an inclined position, the lowermost card being movable by the slide over the upper end of said member.

11. An interleaving device as claimed in claim 10 in which the said abutment member is a lever pivoted at a point remote from its centre of gravity.

12. An interleaving device as claimed in claim 11 in which the said abutment member is a lever pivoted at a point remote from its centre of gravity.

In combination; an interleaving device comprising a box-like main frame open at the bottom; a plurality of spaced card supporting pins rigidly secured to and projecting inwardly from each side of said main frame; a stack of cards mounted in said main frame on said pins, each of said cards being provided with spaced notches in each side edge thereof; a secondary frame mounted in said main frame opposite the secondary frame, horizontal movement of the slide in one direction causing the downmost card of the stack to move horizontally to a position in which notches in the lowermost card align with said card support means whereby it is no longer supported by the card support means, but in which one end of the card is supported by said support member while the other end of the card is supported by the slide, and subsequent movement of the slide in the opposite direction removing the slide from said other end of the card whereby the slide slips out of said downwardly sloping end portion; means carried by said device cooperating with a notch in all of the cards disposed above the bottom card in a stack of cards disposed in said main frame to thereby prevent horizontal movement thereof as the lowermost card is being removed by said card engaging slide; and means, operable when the secondary frame is in any of the said spaced positions, for moving the slide.

13. In combination; an interleaving device comprising a box-like main frame open at the bottom; a plurality of spaced card supporting pins rigidly secured to and projecting inwardly from each side of said main frame; a stack of cards mounted in said main frame on said pins, each of said cards being provided with spaced notches in each side edge thereof; a secondary frame mounted in said main frame opposite the secondary frame, horizontal movement of the slide in one direction causing the downmost card of the stack to move horizontally to a position in which notches in the lowermost card align with said card support means whereby it is no longer supported by the card support means, but in which one end of the card is supported by said support member while the other end of the card is supported by the slide, and subsequent movement of the slide in the opposite direction removing the slide from said other end of the card whereby the slide slips out of said downwardly sloping end portion; means carried by said device cooperating with a notch in all of the cards disposed above the bottom card in a stack of cards disposed in said main frame to thereby prevent horizontal movement thereof as the lowermost card is being removed by said card engaging slide; and means, operable when the secondary frame is in any of the said spaced positions, for reciprocating said slide horizontally.

14. The combination as claimed in claim 13 in which said card holding means is mounted on said secondary frame.

15. In combination; an interleaving device comprising a box-like main frame open at the bottom; a plurality of spaced card supporting pins rigidly secured to and projecting inwardly from each side of said main frame; a stack of cards mounted in said main frame on said pins, each of said cards being provided with spaced notches in each side edge thereof; a secondary frame mounted in said main frame opposite the secondary frame, horizontal movement of the slide in one direction causing the downmost card of the stack to move horizontally to a position in which notches in the lowermost card align with said card support means whereby it is no longer supported by the card support means, but in which one end of the card is supported by said support member while the other end of the card is supported by the slide, and subsequent movement of the slide in the opposite direction removing the slide from said other end of the card whereby the slide slips out of said downwardly sloping end portion; means carried by said device cooperating with a notch in all of the cards disposed above the bottom card in a stack of cards disposed in said main frame to thereby prevent horizontal movement thereof as the lowermost card is being removed by said card engaging slide; and means, operable when the secondary frame is in any of the said spaced positions, for reciprocating said slide horizontally.

16. The combination as claimed in claim 15 in which said card holding means is mounted on said secondary frame.

17. In combination; an interleaving device comprising a box-like main frame open at the bottom; a plurality of spaced card supporting pins rigidly secured to and projecting inwardly from each side of said main frame; a stack of similar cards mounted in said main frame
on said pins, each of said cards being provided with spaced notches in each side edge thereof and a notch in an end edge thereof; a secondary frame mounted in said main frame so as to constitute an end wall thereof and positionable in a plurality of fixed spaced positions in said main frame whereby to accommodate cards of different lengths; means retaining said secondary frame in each of said spaced positions; a horizontally movable card engaging slide mounted in said secondary frame and adapted to engage and move the lowermost card of said stack to a position in which said notches are in register with said card supporting pins; means carried by said secondary frame and adapted to be inserted into the said notches in the end edge of said cards for holding the upper cards of said stack against horizontal movement as successive bottom cards are moved by said slide to bring the said notches thereof into register with said pins; and means operable, when said secondary frame is in any of said spaced positions, for reciprocating said slide horizontally.

18. In combination; an interleaving device comprising a box-like main frame open at the bottom; a plurality of spaced card supporting pins rigidly secured to and projecting inwardly from each side of said main frame; a stack of similar cards mounted in said main frame on said pins, each of said cards being provided with spaced notches in each side edge thereof; a secondary frame mounted in said main frame so as to constitute an end wall thereof and positionable in a plurality of fixed spaced positions in said main frame whereby to accommodate cards of different lengths; means retaining said secondary frame in each of said spaced positions; a horizontally movable card engaging slide mounted in said secondary frame and adapted to engage and move the lowermost card of said stack to a position in which said notches are in register with said card supporting pins; interengaging means between said cards and one of said frames by which the upper cards of said stack of cards are held against horizontal movement as successive lowermost cards are removed from the bottom of said stack of cards by said slide; and means operable, when said secondary frame is in any of said spaced positions, for reciprocating said slide horizontally.

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