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APPARATUS FOR SEPARATING MULTIPLE
INVOICES AND CARBONS

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3 Claims. (Cl. 282—1)

This invention relates to apparatus for separating a plurality of sheets of paper such as multiple copy invoices and carbons and particularly relates to the utilization of controlled vibration in the plane of the papers to be separated.

Heretofore, bundles of multiple invoices of this kind have been separated into their component parts either by hand, separating each unit manually, or by apparatus such as that of Patent 2,098,158, dated November 2, 1937, in which the edges of the sheets were ruffled by mechanical means such as rotating brushes and at the same time disturbed by means of a current of air such as that produced by a fan.

The primary object of this invention is to provide apparatus which is adapted to accommodate a plurality of multiple record sheets such as sales invoices or the like, each including an original record sheet and a plurality of duplicates or carbon copies, each of the latter being provided with an interleaved carbon sheet, the operation acting to selectively and successively remove from the bundle the carbon sheets and then the various duplicate copies of the record page. Each set of the successively removed sheets may be collected in a basket or suitable receiver, the latter being adapted to retain the removed pages in their original sequence of assembly.

Another object of the invention is in the provision of an apparatus for this purpose which will be simple and economical to fabricate and will have a minimum of moving parts.

Another object is to utilize rapid vibration substantially in the plane of the sheets to be separated in combination with means for selectively engaging certain of said sheets to retain them while permitting other sheets of the bundle to move out of the bundle in the direction of the vibration and under the action of gravity so that they may be received in a suitable receptacle.

These and other objects and advantages will be further apparent from the following description and from the attached drawing which forms a part of this specification and illustrates a preferred embodiment of the invention and its mode of operation.

In the drawing,

Figure 1 is a vertical and part-sectional view of an apparatus adapted to practice this invention.

Figure 2 is a perspective view of a bundle of sheets to be separated, illustrating one arrangement of perforations and slots so that the bundle may be selectively separated into the desired components.

Figure 3 is an enlarged vertical sectional view of a bundle of sheets illustrating in more detail an arrangement of perforations and slots in a bundle of sheets to be separated.

Referring to the drawing and particularly to Figure 1, reference numeral 10 illustrates a shaft adapted to be rotated by any suitable means such as an electric motor 11, the latter being supplied with electric current from any suitable source through wires 12 and switch 13. Shaft 10 is provided with an eccentric spindle 14 on which the bundle of invoices or other sheets to be separated, generally designated 15, may be supported. Suitable securing means, such as a threaded nut 16, are provided to retain bundle 15 on spindle 14. This arrangement will impart to spindle 14 and bundle 15 a rapid vibration or reciprocating motion of relatively small amplitude substantially in the plane of the sheets in the bundle, for a purpose which will be described in more detail below.

Motor 11 is illustrated in this example as being supported upon any suitable base such as a table 17, and is preferably arranged so that bundle 15 is supported over a basket or receptacle 18.

Referring to Figures 2 and 3, which illustrate one method of arranging slots and perforations in the bundle 15 to be separated, reference numeral 19 designates a perforation which extends through all of the original sheets 20 as well as the duplicate sheets 21, 22 and 23 in the bundle 15. The position of perforation 19 is above the upper edge of all of the carbon sheets 24 as shown by the dotted line in Figure 2. In order to remove all of the carbon sheets 24, perforation 19 in bundle 15 is threaded onto eccentric spindle 14 and the motor is operated to rotate at approximately 1000 to 2000 R. P. M. This will vibrate or reciprocate the bundle in a vertical plane and will cause carbons 24, which are unsupported by spindle 14, to drop into basket 18 for disposal.

In order to separate all of the original copies 20 from bundle 15 a second perforation 25 is provided through all of the sheets in the bundle. In the original copies 20 of the bundle a slot 26 extends from perforation 25 to the edge of the sheets. When perforation 25 is threaded over spindle 14 and the motor is operated, the original sheets 20 will be unsupported and the vibration or reciprocation of the bundle 15 will cause them to drop under the action of gravity into basket 18. It will be found that these sheets will be in numerical order or in whatever other order they were placed in the original bundle.

In order to remove the first duplicate, for example, a third perforation 27 extends through the remaining sheets 21, 22 and 23. In sheets 21 a slot 28 extends from perforation 27 to the edge of the sheet, in the same manner and for the same purpose as has just been explained for sheet 20. When sheets 21, 22 and 23 in the bundle 15 are threaded over spindle 14 by means of perforation 27 and motor 11 is operated to rotate shaft 10, sheets 21 will be unsupported and will fall into basket 18. Similarly, perforation 29 extends through sheets 22 and 23, and slot 30 is provided in sheet 22 connecting perforation 29 with the edge of that sheet so that it may be removed from the two remaining sets of sheets in the bundle by the operation just described. This will leave only the third duplicate set, sheet number 23, so that the operation of selectively separating, first the carbon sheets and then the desired sets of original and duplicates has been accomplished. Obviously the sequence of operations may be varied from that just given so that, for example, the third or any other desired duplicate may be removed first. The essential feature of the invention appears to lie in a method and apparatus for selectively separating desired sheets from a bundle of the latter by restraining certain of the sheets while leaving others unrestrained and imparting to the bundle a motion such as a sustained vibration, oscillation, or limited reciprocation in the plane of the sheets. Such motion is preferably but not necessarily in a vertical plane and may be in a vertical direction. A series of slots and perforations may be utilized which will restrain certain predetermined sheets and will leave certain others of the sheets unsupported so that the latter will separate from the bundle under the action of the motion, or, if the

sheets are placed vertically, under the combined action of the motion and the force of gravity.

Although a certain specific construction and mode of operation are described and illustrated, it is obvious that many modifications and changes could be made without departing from the invention, and all such that are within the scope of the appended claims are embraced thereby.

I claim:

1. An apparatus of the character described comprising a rotatable element, an eccentric spindle extending outwardly from said element having an axis parallel to the axis of rotation of said element, and means on said spindle for securing a bundle of selectively perforated and slotted sheets of paper, cardboard or the like, on said spindle for the purpose described.

2. An apparatus of the character described comprising a horizontal shaft, means for rotating said shaft, an eccentric spindle extending from said shaft and means on said spindle for securing a bundle of selectively perforated and slotted sheets of paper, cardboard or the like, on said spindle for the purpose described.

3. An apparatus of the character described comprising a rotatable element, a rod associated therewith and so constructed and arranged that rotation of said rotatable element will impart a sustained oscillation to said rod in a plane substantially at right angles to its axis, and means on said rod for holding thereon a bundle of selectively perforated and slotted sheets of paper, cardboard and the like so that the oscillation of said rod will be effective to separate the slotted and unsupported sheets from the perforated sheets of said bundle.

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