Dec. 28, 1965 R. P. VILLALON 3,226,283

SYSTEM FOR SIMULTANEOUSLY PERFORATING AND RE-ENFORCING THE HOLE SO MADE IN SHEET MATERIAL FOR FILING PURPOSES

Filed June 11, 1962 2 Sheets-Sheet 1

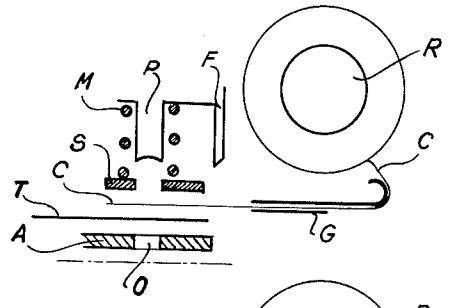


Fig. 1

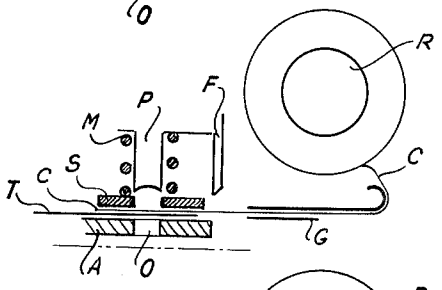


Fig. 2

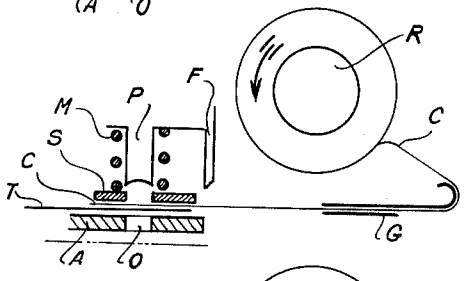


Fig. 3

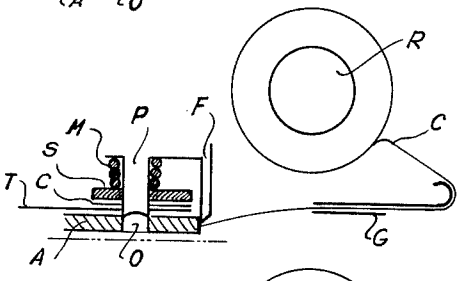


Fig. 4

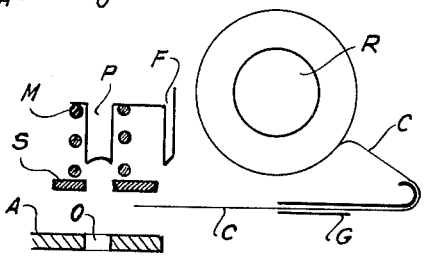


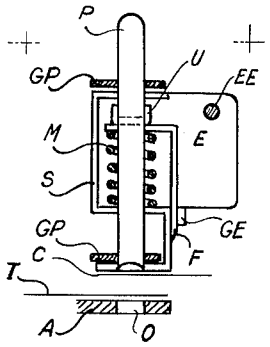
Fig. 5

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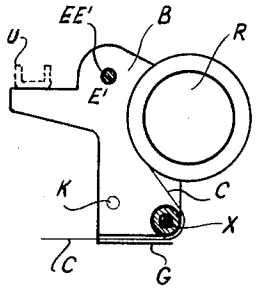
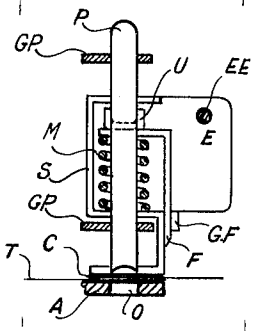


Fig. 6



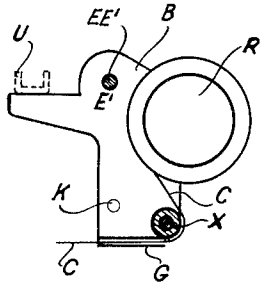
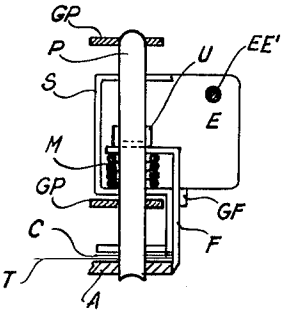


Fig. 7



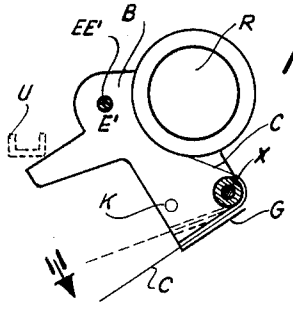


Fig. 8

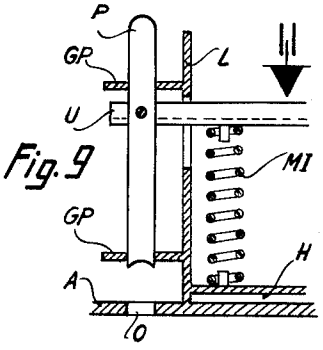


Fig. 9

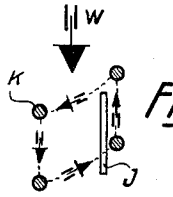
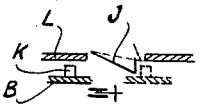


Fig. 10



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3,226,283

SYSTEM FOR SIMULTANEOUSLY PERFORATING AND RE-ENFORCING THE HOLE SO MADE IN SHEET MATERIAL FOR FILING PURPOSES

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Claims priority, application Spain, June 20, 1961, 268,421
9 Claims. (Cl. 156—522)

This invention relates to a method and means for perforating and simultaneously reenforcing the hole so made in laminar or sheet materials for filing purposes, and in general in any kind of sheet material that has to be securely held in elements provided with the necessary fixing means passing through said perforations in the borders thereof, such as blocks for notes, agendas, catalogues, copies of correspondence, etc.

The reenforcing material used in this invention is adhesive tape of the usual commercial kind.

The principal object of this invention is the making of each perforation and its reenforcement by means of an assembly of four distinct devices operated as a unit by preferably one operational control coupled rigidly or elastically to said devices. The operational phases involved are the pressing of the extremity of the reenforcing tape by means of a rigid or elastic element on to the border of the sheet element under treatment, while at the same time pressing the zone of the border thus treated against the platform-base of the apparatus situated underneath. Then the tape is extracted and fed from a roll to each of the zones thus treated in equal and successive lengths, with the extraction being effected during the outward movement of the device performing this function, while the feeding is effected by the inward movement of the same device towards the operational zone of the border; Then the border zone bearing the portion of adhered tape is perforated by means of a punch which is guided by and passes through the element pressing the tape reenforced zone of the border on to the platform-base of the apparatus, this latter mentioned base being provided with a recess for accommodating the cutting extremity of said punch to produce a cleanly cut hole. Then the adhesive tape is cut off at the border of the sheet and complementary means are provided in the system to coordinate the functions of the distinct integrating elements chronologically and geometrically during each and every successive cycle of operation, while means are also provided for annulling the tape insertion device completely so that the apparatus will function as a punching machine only without tape reenforcement.

Another object of the invention is to provide the reciprocating extraction and feeding device for the tape with an incorporated roll of adhesive tape and a guide for feeding the unrolled portion to the operational zone on the border of the sheet under treatment, or the tape guide only is attached to the reciprocating device above mentioned while the roll of adhesive tape is separate from this device and is stationary except for its unrolling motion. In both cases the roll of adhesive tape is renewable, while the guide is so formed as to canalize the protruding portion of the tape longitudinally with the concave side above or below, to provide it with the stiffness necessary to enter unhindered within the working zone between the foot of the pressure device and the platform-base at each successive operation of reenforcement and punching.

Among the possible variations in the order of succession of the operational phases exercised by each of the component parts of the apparatus, it is preferred that the protruding extremity of the tape be first of all pressed together with the border of the sheet under treatment by the presser foot against the platform-base, whereupon the

tape guide immediately moves to its outer position, together with the tape roll when this latter is mounted on the same support as the guide, but alone when said tape roll is mounted separately as mentioned above, and in so doing unrolls a portion of tape from the roll, exactly similar in length to the piece already adhered to the border of the sheet under treatment and firmly imprisoned as already described, followed by the operations of cutting off the tape at the border and the punching operation, which operations may be in successive order, either one before the other, or may be effected simultaneously.

As soon as the three operational devices, the pressure foot, the punch and the cutter have lifted sufficiently to allow the unhindered insertion of the next canalized measured protruding portion of tape between the pressure foot and the platform-base, the guide-feeder device returns to its initial position as in the previous operation, in preparation for a repetition of the cycle of operations, while it should be mentioned that the three operational devices above mentioned may take place in any order or simultaneously, the pressure foot being the last to rise in order to aid in the clean withdrawal of the punch from the perforation in the reenforced sheet, and to take up its initial uppermost position ready for its next pressing operation.

A further object of the present invention allows the punching operation to be performed without the introduction of the reenforcement tape, for which purpose the tape roll support with the guide, or the guide only when the tape roll support is separate from and does not move with the guide, are rendered inoperative by means of an independent control which moves the guide and/or without the tape roll completely out of the sphere of action of the tape insertion zone.

This invention allows two or more reenforced perforations to be made simultaneously in the same border of a sheet, at equal or different distances apart, by a repetition of the number of essential parts constituting the system herein described.

For a better understanding we will now describe some realisations of the system of a nonlimiting character by the help of the two sheets of drawings accompanying this specification.

FIGURES 1 to 5 illustrate diagrammatically sequential phases during operation of the invention.

FIGURES 6, 7 and 8 show diagrammatically a structural embodiment showing the essential elements in sequential operation.

FIGURE 9 is a lateral view of a detail of the mechanism, and

FIGURE 10 is a diagrammatic view of the retention device for the reel of adhesive tape, together with a detail of its ratchet.

FIGURES 1 to 5 show schematically the essential elements comprising the system in five successive phases of one complete cycle, in which realisation the guide only makes the reciprocating extraction and feeding movements, the tape roll remaining stationary.

In the drawings, S represents the presser foot for holding the reenforcing tape C, whereas G is the reciprocal guide, P is the punch for perforating the reenforced border of the sheet under treatment T, while F is the cutter for cutting off the measured length of adhesive tape already stuck to the sheet T, R is the support for the tape roll C. The platform base A is provided with the recess O for accommodating the cutting extremity of the punch P after passing through the reenforced sheet. The spring M presses on the presser foot S and also returns the punch P and the cutter F to their initial positions.

FIGURE 1 shows the relative positions of the elements at the beginning of a cycle of operations, where the pro-

truding piece of adhesive tape C from the guide G is in position with the guide G in its innermost position.

FIGURE 2 shows the punch P partially descended and also the cutter F neither of which has yet fulfilled its mission, while the presser foot S has descended and forced the adhesive tape against the border of the sheet T imprisoning both between the foot S and the platform-base A.

FIGURE 3 shows the guide G having moved to its outer position and in so doing unrolled a measured portion of tape from the stationary roll R which has turned in the direction indicated by the arrow, the extremity of the tape being firmly held as in FIGURE 2.

FIGURE 4 shows the punch P and the cutter F at the end of their descending strokes, the reenforced border having been perforated and the tape cut off at the border of the sheet, the protruding portion of tape from the guide G now having a canalized form which stiffens it and obliges it to become horizontal, in readiness for insertion when conditions as shown in the next position have been established.

FIGURE 5 shows that the presser foot S, the punch P and the cutter F have risen sufficiently to allow the extremity of the adhesive tape C to take up the position as shown in FIGURE 1, upon which the guide G moves in to its innermost position, thus completing one cycle of operations.

As previously mentioned, the tape is given a canalized form upon passing through the guide G to stiffen it, while the adhesive side of the tape is facing the platform-base A. FIGURES 6 to 10 refer to a possible realisation of this invention in which the different elements are shown in more detail, the tape roll in this case being carried on the same support as the guide, so making similar reciprocal movements, so that R and G move in unison.

For clarity's sake, some of the elements are shown separated from their normal working positions, so that in the FIGURES 6, 7 and 8, the points E and E' coincide normally while the U sections marked U are shown separated but coincide normally when E and E' coincide.

Referring to FIGURES 6, 7 and 8 in combination with FIGURE 9, two guides GP, GP are shown for guiding the punch P, while U is the control tie bar uniting all the punches comprising the apparatus as will be understood from FIGURES 6, 7 and 8, said control tie bar sliding up and down in slots formed in the lateral supports of the guides GP, GP. The guide and tape roll support B is articulated at E to a support made solid with the lateral supports of the guides before mentioned and approximately level with the upper guide GP, said support B making the reciprocative movements for the extraction and feeding of the adhesive tape.

C indicates the adhesive tape and T the sheet under operation. The platform-base A is provided with the die recess O to receive the cutting extremity of the punch P, while F indicates the cutter for cutting off the already adhered tape.

The support B which carries the tape roll R and the guide G is provided with a roller X for the adhesive tape, and a projection on which the control tie bar U operates, and finally a limiting stop K for the reciprocating movement of the piece B.

FIGURE 9 shows at H the space between the pressure-foot and the platform-base A for the insertion of the sheet under treatment.

FIGURE 10 shows schematically a possible solution by catch mechanism for the piece B to regulate eventual retention of same in the return position, comprising an opening formed in the respective lateral strut of the chassis containing a leaf spring J, shown in the drawing, the plate B in section with the limiting stop K on the interior face of same (shown in plan view in FIGURE 10). When the control tiebar U upon descending bears against the prolongation of the piece B, FIGURE 8, this latter piece turns about the pivot point E, and the limiting stops K occupies the distinct positions shown in FIGURE 10 in the front view of same, where the leaf spring J is indicated also in the upper left position corresponding to the position of B in the FIGURE 6; when operator presses on the control tiebar, the limiting stop descends with the piece B to the lower left position shown in FIGURE 10, and corresponding to the position of B in FIGURE 7; when the piece B turns under pressure from the tiebar U, FIGURE 8, K takes up the position lower right, overcoming thereby the leaf spring J, and when pressure is removed from the control tiebar, during the recuperation cycle, the piece B ascends vertically, while K passes from the lower right to the upper right position, but while moving, the projection from the leaf spring J prevents the forward oscillation of B, which period corresponds to the recuperation position of the remaining devices, and as soon as the limiting stop K reaches the said upper right position, the leaf spring obstacles of J is passed, so that B by gravity may oscillate in advance and line up the protruding piece of tape from its guide G.

The canalizing of the protruding end of the tape C to render it rigid is effected in this example by means of a transverse element mounted elastically on the roller X to curve the tape with the convex side above or below at will.

The whole of the piece B may be dismounted to change or renew the tape roll R.

The realization herein shown functions as follows: In FIGURE 6, all the elements are at rest and the tape protrusion C is situated in the working zone between the presser-foot, or the lower arm of the piece S, and the platform A. Upon pressing the control bar U downwards, the solidly coupled punch P begins to descend also, as also does the piece S whose lower horizontal portion makes contact with the tape and this latter with the sheet under treatment, but without varying the position of the other elements, spring M, cutter F and the piece B.

The control tiebar U and the punch P, upon continuing their descent and overcoming the action of the spring M, seeing that the piece S cannot descend further, said punch P perforates the conjoint assembly of tape sheet, but at the same time the control tiebar U obliges the piece B to retrocede together with the guide G. Since the end of the tape is firmly held, this extracts another measured length of tape from the roll which turns on its spindle for such purpose, while F makes the cutting operation immediately before B occupies its maximum return position.

Upon pressure being released from the control tiebar, the spring M pushes it upwards to its initial position together with the punch P, while the spring raises the cutter also, but the piece B momentarily still retains its retroceded position, and returns to its initial position as previously explained in the functioning of the catch mechanism, or when S, P and F have cleared the working zone, this forward or inward oscillation being possible by the piece B because the control tiebar is not pressing on the protrusion piece of the said piece B.

Any of the realisations of the invention herein given may be adapted for the punching operation only, for which purpose a fork-piece is provided on the front face of the platform A, not shown in the drawing, movable in a parallel direction to its two branches which extend upwards at the sides of the chassis, or in loose contact with the respective exterior surfaces of the strut supports, which fork-piece, when occupying the forward position in the apparatus, does not intervene in the movement of the piece B, but upon being displaced toward the rear, oblige the piece B to recede and to hold it in that position while the perforations in the sheet material are effected where reinforcements are not required.

The foregoing realizations concretely describe two simultaneous perforations, but a multiplication of the individual devices will allow perforations to be made in two or more positions, or such groupings of the devices may be arranged to be displaced laterally to make regularly spaced perforations, either by establishing definite

and fixed spacings between the various devices or arranging some fixed and some movable, but a simple control is preferred by means of which the individual devices are separated by constant subdivisions.

The front of the platform is covered with a removable plaque, preferably flexible, to collect all the scrap material proceeding from the cutting and punching operations.

The whole machine is covered with a suitable casing, and may be of any size, while it is well understood that the examples herein given are of a nonlimiting character, while any alterations may be made which still retain the essential characteristics of the invention, which will all be included within the following claims.

I claim:

1. A device for simultaneously perforating and reinforcing an aperture in sheet material comprising a fixed platform having a hole for supporting a sheet, means for feeding a strip of reinforcing adhesive tape to a predetermined position above said sheet over said hole, means for pressing said adhesive tape against said sheet to apply said tape to said sheet, a punch for perforating said sheet cooperating with said hole, means normally urging said punch to initial position away from said sheet, a cutter connected to said punch for cutting off a length of said tape when said punch is depressed, means for supplying said adhesive tape cooperating with said punch and cutter, means for extracting an additional length of tape from said supplying means when said adhesive tape and said sheet are pressed together, said cutter cutting said strip of tape adjacent the border of said sheet when said punch is depressed to perforate said tape and sheet whereby said means for feeding a strip of reinforcing adhesive tape feeds, said additional length of tape above said hole when said punch and cutting means are withdrawn by said means normally urging said punch to initial position.

2. A device as set forth in claim 1 wherein said feeding and supply means are removable to facilitate the renewal of adhesive tape supply, and wherein means are provided to reciprocate said feeding means relative to said platform, said feeding means making said reciprocating motion while the tape supply remains stationary and means for giving a canalized form to the extremity of the tape longitudinally to provide sufficient stiffness for the tape to move above said sheet.

3. A device according to claim 1 wherein the rotational order of succession of the operational phases, beginning with the gripping of the extremity of the reenforcing adhesive tape protruding from a guide, and pressing it together with the sheet material against said platform; followed immediately by the outward movement of the extractor-feeder means, the guide unrolling a length of tape from the roll equal in length to the portion already stuck on the border of the sheet material, and finally followed by the cutting off operation of the tape adhered to the sheet under treatment, the punching operation occurring simultaneously with that of any of the other operations.

4. A device according to claim 3, characterised by the fact that the recuperation of all the devices to their initial positions may be in a reverse order to that of the period of activity, or altering their succession or rendering two or more individual recuperations simultaneous, except that of the extractor-feeder device for the tape, which is momentarily retained in its receded position in relation to the recuperation of the other devices, and cannot advance to its initial position until all the other devices intervening in the system have risen sufficiently so as not to hinder the introduction of the extremity of the tape protruding from the guide, which extremity was extracted during the period of activity, the feeding of the tape by the system being effected during this period, when all the devices have recovered their initial positions.

5. A device according to claim 1, characterised by the possibility of using the apparatus as a perforator only, for which purpose an independent auxiliary control only when the roll is stationary, obliges the carrier to clear the working zones from their respective tape extremities protruding from their respective guides, and to maintain said guides in the receded position until the system has carried out its eventual perforation operation only.

6. A device according to claim 1, characterised by the face that by means of an appropriate distribution of the groupings of the different devices for pressing and holding, tape extraction, alignment, punching and cutting, it is possible to realise simultaneously, two or more perforations with their corresponding reenforcements.

7. A device according to claim 6, characterised by the fact that the groupings of two or more devices, or one only, for perforating and reenforcing, may be permanently connected together to the base of the apparatus, or be adjustable in their distances the one from another, or some may have fixed relative distances while others may be adjustable in their distances from the relatively fixed ones.

8. A device according to claim 1, characterised by the preferential employment of a single control for the whole of the groupings, while it is possible to provide independent controls for each grouping or any two or more grouping.

9. A device according to claim 1, in which the front part of the lower face of said platform is provided with a collector of the trimmings and scrap materials proceeding from the punching and cutting operations, such collector being preferentially a plastic elastic encircling receptable around the exterior of the platform, which may at the same time serve as a shock absorber and protector for the surface of the table or stand on which the apparatus is kept and operated.

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