United States Patent

[11] 3,577,575

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[33] **Japan**
[31] **43/20001**

[54] **BINDING AND OPENING DEVICE**
7 Claims, 12 Drawing Figs.

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29/564, 30/123, 93/1, 93/1.1, 93/58.3
[51] **Int. Cl.** **B25b 27/14,**
B26b 27/00, B31f 5/02
[50] **Field of Search** ..... 93/1 (C), 1 (G), 1.1, 58 (H), 58.3; 7/14.1; 30/123; 29/564

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Attorney—Kelman and Berman

ABSTRACT: The binding device has a cutter for making a U-shaped slot in papers, a cam for bending down the U-shaped portion of the papers, and a knife for making an I-shaped slot in the papers and for inserting the portion into the I-shaped slot. The binding and opening device has a plurality of sets of the cutter, cam, and knife and further has a pair of edges for opening a letter.

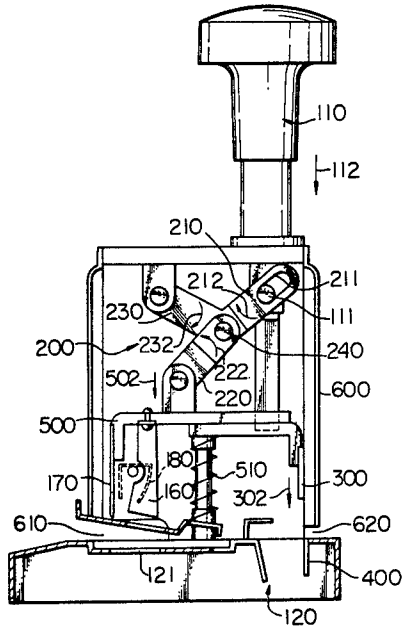


Fig. 1

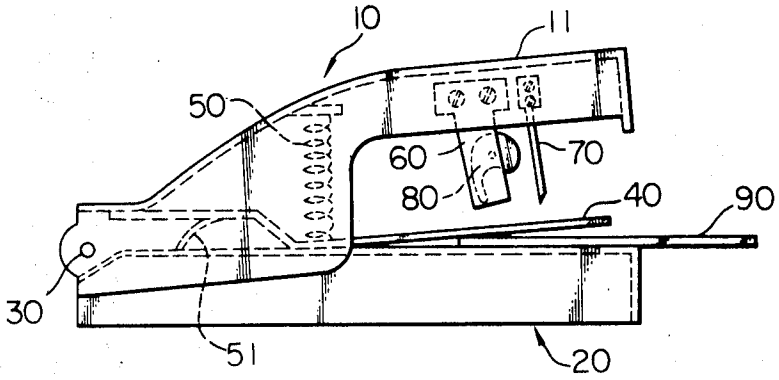
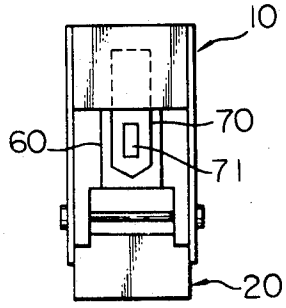


Fig. 3

Fig. 2



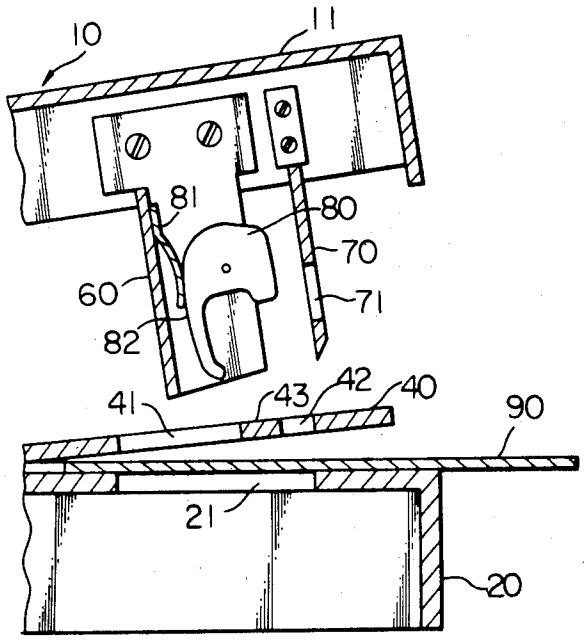


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Fig. 4

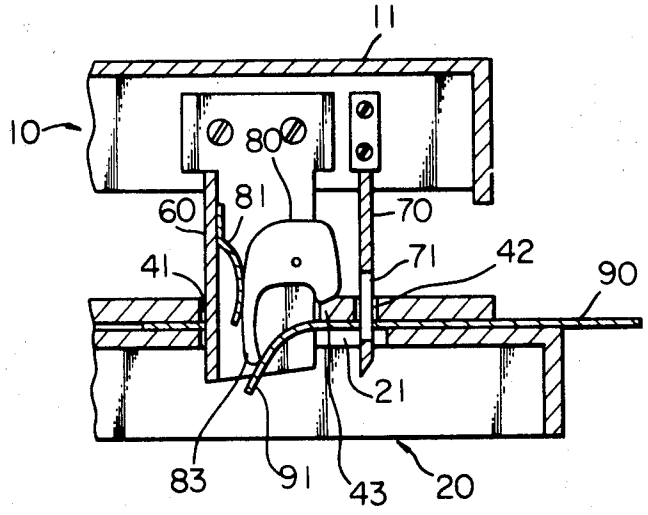

Fig. 5

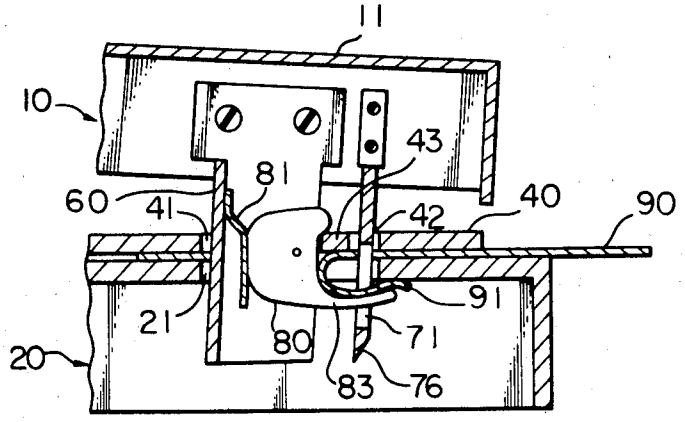

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Fig. 6

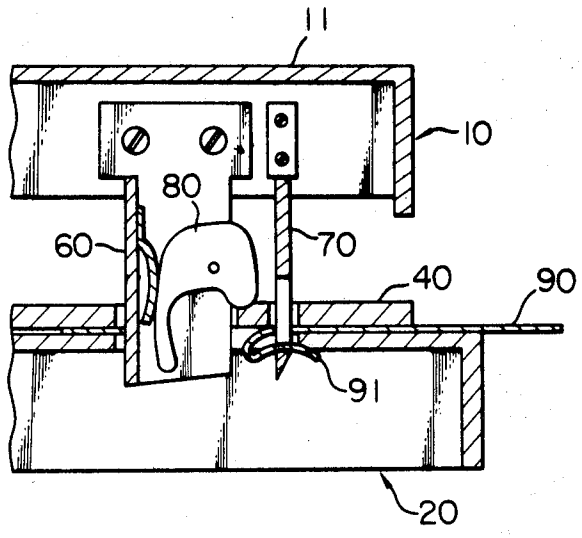

Fig. 7

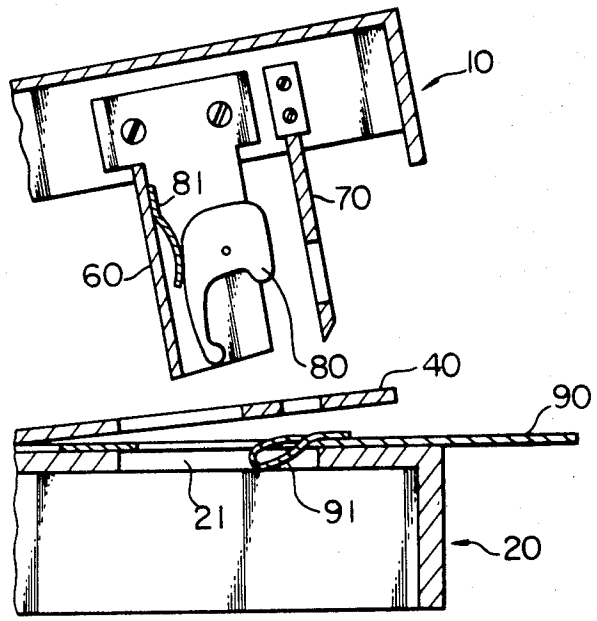

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Fig. 8

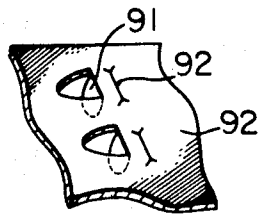

Fig. 9

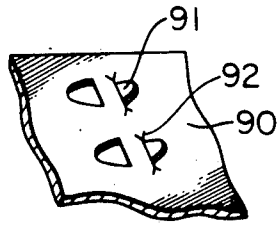

Fig. 10

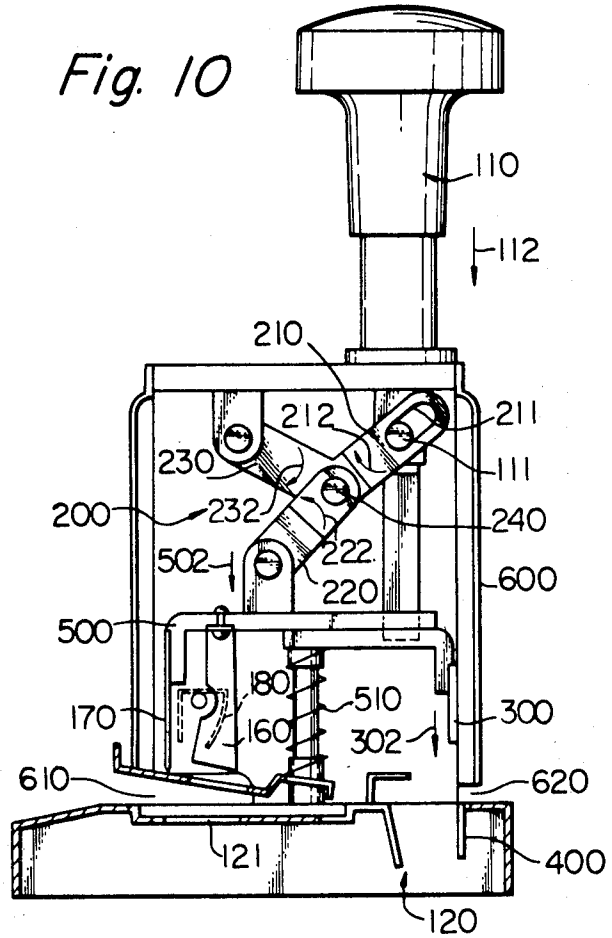

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Fig. 11

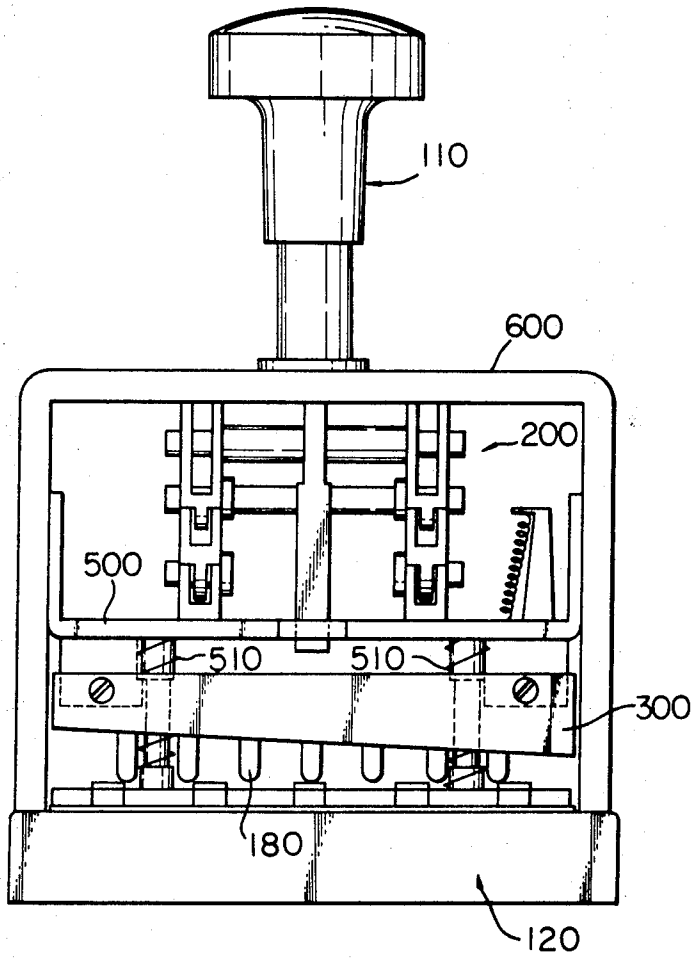

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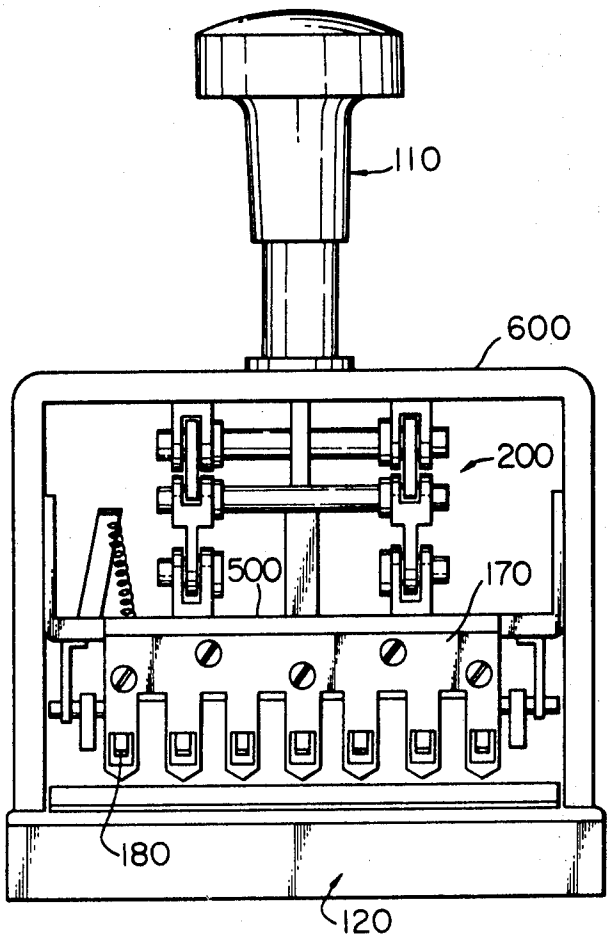
Fig. 12



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BINDING AND OPENING DEVICE

BACKGROUND OF THE INVENTION

This invention relates to a device for binding papers and opening a letter, and more particularly to a device for binding papers readily without using a special binding element or bonding agent and for opening a letter easily without using a knife or a pair of scissors.

Conventionally, staples or bonding agents are generally used to bind papers. It is not so easy to open the papers bound by such manner. Further, the papers are sometimes subjected to soil and damage due to rust of staples or change in quality of bonding agent. A pair of scissors or a knife is generally used to open a letter. Thus, various kinds of tools are necessary for binding papers or opening a letter and if only one of these tools is not at hand we suffer much inconvenience.

SUMMARY OF THE INVENTION

A binding device of this invention comprises: a lower member for receiving papers to be bound; an upper member pivotally mounted on the lower member; U-shaped cutter means attached to the upper member; I-shaped knife means attached to the upper member and spaced by a given distance in parallel with the U-shaped cutter means; and cam means pivotably mounted on the U-shaped cutter. When the upper member is moved down toward the lower member, the U-shaped cutter makes a U-shaped slot in the papers and simultaneously the I-shaped knife means makes an I-shaped slot in the papers to form U-shaped slots and the cam means bend the U-shaped portion of the papers. When the upper member is moved up from said lower member, the I-shaped knife means inserts the U-shaped portion of the papers into the I-shaped slot. Thus the papers are bound easily without using a special binding element.

A binding and opening device of this invention comprises: a lower member for receiving papers to be bound or a letter to be opened; an upper member; a link mechanism for slidably supporting the upper member on the lower member; a plurality of sets of the U-shaped cutter means, I-shaped knife means, and cam means coupled through the link mechanism to the upper member; upper edge means coupled through the link mechanism to the upper member; and lower edge means attached to the lower member in opposition to the upper edge. When the upper member is moved down toward the lower member, the respective U-shaped cutter means makes U-shaped slots in the papers and simultaneously the respective I-shaped knife means makes I-shaped slots in the papers to form U-shaped slots and the respective cam means bend down the respective U-shaped portions of the papers. Further, at the same time the upper edge means engages the lower edge means to open the letter. When the upper member is moved up from the lower member the respective I-shaped knife means inserts the respective U-shaped portions into the respective I-shaped slots. Thus the papers are bound easily without using a special binding element and further a letter is opened without using a pair of scissors or a knife.

Therefore, an object of this invention is to provide a device for binding papers without using a special binding element or bonding agent.

Another object of this invention is to provide a binding and opening device wherein papers or a letter can be bound and opened by a single tool.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevation of a binding device in accordance with this invention.

FIG. 2 is an end view looking from the right of the elevation shown in FIG. 1.

FIGS. 3 to 7 are enlarged fragmentary section views illustrating the operations of the binding device.

FIGS. 8 and 9 show papers worked by the binding device of this invention.

FIG. 10 is a side elevation of another embodiment in accordance with this invention.

FIG. 11 is an uncovered end view looking from the right of the elevation shown in FIG. 10.

FIG. 12 is an uncovered end view looking from the left of the elevation shown in FIG. 10.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference now to the drawings and more particularly to FIG. 1 thereof, an upper member 10 is pivotally attached to a lower member 20 by a pivot pin 30. An apertured retaining member of keep plate 40 is disposed between upper member 10 and lower member 20 and attached to upper member 10. As shown in the drawing, a compression spring 50 is disposed between upper member 10 and keep plate 40 while a leaf spring 51 is disposed between keep plate 40 and lower member 20. Upper member 10 is provided with a cutter 60, a knife 70, and a cam 80.

As shown in more detail in FIG. 3, cutter 60 and knife 70 are spaced in parallel with each other and fixed to a handle portion 11 of upper member 10. Cam 80 is disposed between cutter and knife 70. Cam 80 is pivotably mounted on cutter 60 fixed on upper member 10. A biasing leaf spring 81 engages a rear face 82 of cam 80. The cutting edges of cutter 60 and knife 70 have a U-shape and an I-shape, respectively, to cut corresponding spacedly adjacent slots in paper 90 retained by the plate 40 on the receiving surface of the lower member 20, the U-shaped slot defining a bight open toward the I-shaped slot.

A rectangular opening 71 is provided in the center of knife 70 (See FIG. 2). Rectangular holes 41 and 42 are provided in keep plate 40 while a rectangular hole 21 is provided in lower member 20 in opposition to associated cutter 60 and knife 70, respectively.

Referring now to FIGS. 1—9, operation of a binding device embodying this invention is explained below. In FIG. 1, papers 90 to be bound are inserted first between lower member 20 and keep plate 40 and disposed at a given position. Then, by applying a force to handle portion 11 of upper member 10, upper member 10 is moved down to a stop position (See FIG. 5). Finally, by reducing the applied force from the handle, upper member 10 returns to the original position to finish binding of the papers (See FIG. 9).

Explaining in more detail, when upper member 10 is moved down to the position as shown in FIG. 4, cutter 60 and knife 70 thrust into papers 90 and are received in holes 41 and 42 of keep plate 40 and hole 21 of lower member 20, respectively. A pawl or prong 83 of cam 80 engages U-shaped flap portion 91 (See FIG. 8.) formed on papers 90 by cutter 60 to push it down. By further pushing down upper member 10, as shown in FIG. 5, cam 80 turns counterclockwise at an intermediate abutment portion 43 between holes 41 and 42 of keep plate 40. Pawl 83 of cam 80 folds U-shaped portion 91 to insert the top end of U-shaped portion 91 into opening 71 of knife 70.

When the force applied to upper member 10 is reduced, upper member 10 returns to the original position by action of compression spring 50. Simultaneously, cam 80 turns clockwise to return to the original position by action of leaf spring 81 (See FIG. 6.). When cutter 60 and knife 70 rise up together, cutter 60 comes out from papers 90 directly while knife 70 comes out therefrom so that U-shaped portion 91 is hung in opening 71 to draw the top end of portion 91 into a slot 92 previously formed by knife 70 (See FIGS. 7 and 9.). Thus, binding operation is completed.

FIGS. 10—12 show another embodiment of this invention. A device shown in the drawings can serve to bind papers at a plurality of positions and in addition to open or unseal a letter. A link mechanism 200 is mounted on an upper member or handle 110. A binding mechanism including a cutter 160, a knife 170 and a cam 180 and an upper edge 300 for opening the letter are coupled to link mechanism 200 through a bracket 500. One side of a lower member 120 is provided with a hole 121 for receiving cutter 160, knife 170 and cam 180. A lower shearing edge 400 is mounted on the opposite side of member 120 to confront with an upper shearing edge 300.

As link mechanism **200** has a conventional structure, it is briefly described below. One end of levers **210**, **220**, and **230** are pivotably coupled each other by a pin **240**. The opposite end of lever **210** is provided with an elongated slot **211**, which engages a pin **111** fixed on upper member **110**. The opposite ends of levers **220** and **230** are pivotably mounted on bracket **500** and a frame or housing **600**, respectively, the housing being fastened to the lower member **120**. As mentioned above, bracket **500** is supported by a compression spring **510**. The binding mechanism including cutter **160**, knife **170** and cam **180** is mounted on one side of bracket **500** while upper edge **300** is mounted on the opposite end of the bracket. A plurality sets of cutter **160**, knife **170** and cam **180** (seven sets are shown in the present embodiment) may be made integrally from a single material, respectively.

When a force is applied to upper member **110** to push it down to the direction of an arrow **112** in FIG. **10**, associated link mechanism **200** operates as follows: Lever **210** moves to the direction of an arrow **212**, lever **220** to an arrow **222**, and lever **230** to an arrow **232**, respectively. Consequently, bracket **500** goes down to an arrow **502**. Thus, the binding mechanism performs aforementioned operation.

Upper edge **300** goes down to an arrow **302** in connection with movement of bracket **500** to engage lower edge **400** fixed on lower member **120**. Accordingly, when a letter is inserted into a port **620** and the operations mentioned above are carried out, a specified part of the letter is opened.

It will be apparent from the foregoing that the binding and opening device in accordance with this invention can bind papers readily without using any conventional staples or a bonding agent and in addition can open letters easily without using a pair of scissors or a knife. Since it is impossible to rebind as even the letter once unbound, this invention is available to keep the privacy of correspondence.

I claim:

1. A binding and cutting device comprising:

a. a first member including receiving means defining a receiving surface for papers to be bound or cut;

b. a second member secured to said first member for motion of a portion of said second member toward and away from a first part of said receiving surface;

c. cutter means secured to said portion for cutting a first, substantially U-shaped slot in papers received on said surface during the motion of said portion toward said surface, said slot bounding a flap in each of said papers;

d. cam means pivotally mounted on said cutter means for holding said flap under said surface during said motion of said portion toward said surface;

e. knife means secured to said portion for cutting a second slot in said received papers spacedly adjacent said first slot during said motion of said portion toward said surface, and for drawing said flap into said second slot during motion of said portion away from said surface;

f. cooperating shearing means on said first and second members for shearing therebetween paper supported on a second part of said surface spaced from said first part when said portion moves toward said surface, said shearing means including

1. a member having a first shearing edge mounted on said portion and spaced from said cutter means, said cam means, and said knife means, said second part of said receiving surface being formed with an opening, and

2. a member having a second shearing edge mounted on said first member contiguously adjacent the opening in said support surface; and

g. manual operating means for moving said portion of said second member toward and away from said surface and for thereby moving said member having a first shearing edge into and out of said opening in shearing cooperation with the member having said second shearing edge.

2. A device as set forth in claim **1**, wherein said receiving surface is apertured, said cutter means and said knife means including respective cutting edges, said cutting edges and a pair of said cam means moving through an aperture in said surface during said motion of said portion toward said surface.

3. A device as set forth in claim **2**, wherein said cam means include a cam member, said part of the cam means including a prong on said cam member, and biasing means biasing said cam member toward a position relative to said cutter means in which said prong is directed toward said aperture when said portion is remote from said surface, the device further comprising abutment means on said first member engaging said cam member and thereby pivoting said cam member when said prong moves through said aperture to direct said prong toward said second slot.

4. A device as set forth in claim **3**, wherein said knife means include a knife member carrying said cutting edge of said knife means and formed with an opening, said opening passing through said surface during said motion of said portion toward said surface, and said prong entering said opening when said cam member is pivoted by said abutment means.

5. A device as set forth in claim **2**, further comprising an apertured retaining member mounted intermediate said surface and said portion for retaining said papers on said receiving surface, said cutting edges and said part of said cam means moving through said retaining member when said portion moves toward said surface.

6. A device as set forth in claim **2**, wherein said second slot is substantially I-shaped, said U-shaped first slot defining a bight open toward said second slot.

7. A device as set forth in claim **1**, further comprising a housing fastened to said first member, said second member being secured by said housing for motion relative to said first member said operating means including a handle movable on said housing, and a motion-transmitting linkage connecting said handle to said second member.