

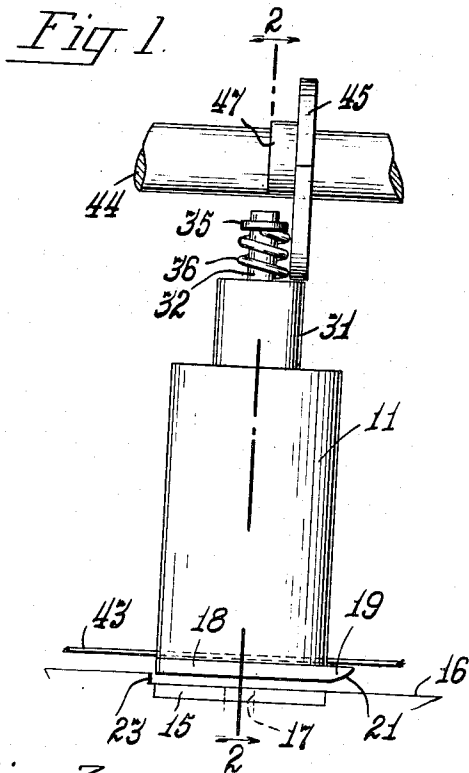
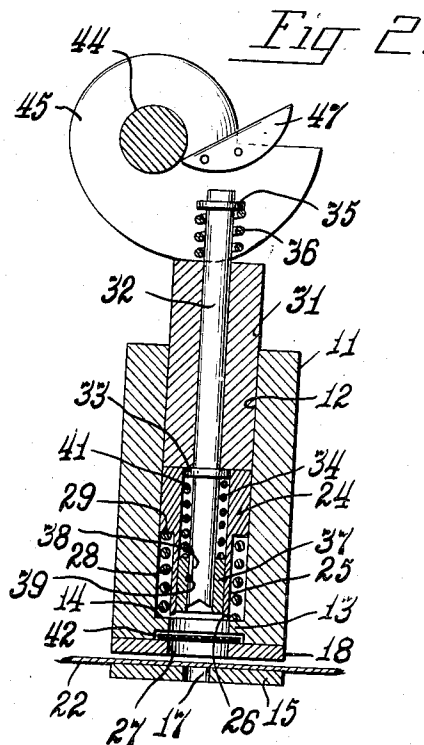
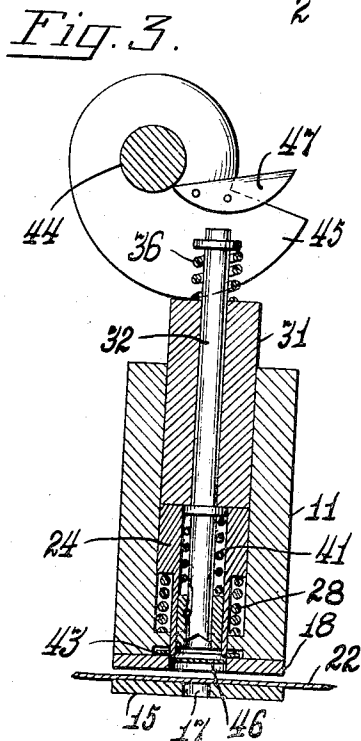
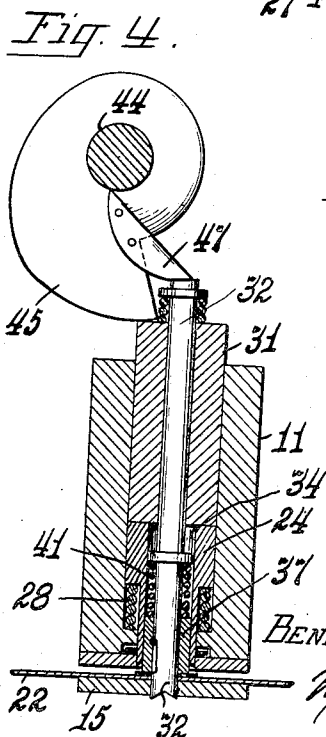
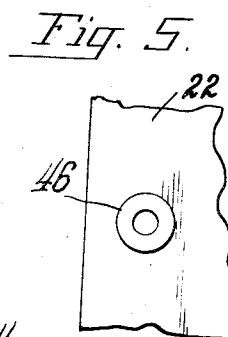
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B. HIRSON

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APPARATUS FOR REINFORCING AND PUNCHING SHEETS

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INVENTOR
BENJAMIN HIRSON
Maurice S. Gage
ATTORNEY

UNITED STATES PATENT OFFICE

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APPARATUS FOR REINFORCING AND PUNCHING SHEETS

Benjamin Hirson, Yonkers, N. Y., assignor to
Strongleaf Paper Corporation, Yonkers, N. Y., a
corporation of New York

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2 Claims. (Cl. 93—1)

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The invention relates to improvements in apparatus for reinforcing and punching sheets, and is more particularly concerned with an assembly of novel constructed patch cutting, attaching and punching tools.

The present invention is constructed for use in the shearing of a patch, preferably circular in outline, out of a strip of sheet material such as, for example, pressure-sensitive adhesive tape, and for attaching the sheared patch firmly to a sheet and then punching a hole through the attached patch and sheets. Sheets having patches of this character attached thereto are thus reinforced in the area surrounding the hole usually provided to receive a ring or post-binder. There have been various types of mechanisms devised to attain this result, but, until the development of the present invention, no fully automatic fool-proof easily operated apparatus has been obtainable. A related apparatus is disclosed in Hirszon et al., Patent No. 2,583,944, granted January 29, 1952, but the patch shearing, attaching and punching mechanism, therein disclosed, is actuated by manipulation of single means in the form of a lever. In the present construction, single oscillatably rotatable operating means is provided for actuating means to operate the patch shearing knife or ring, and separate more positive means is provided to operate the pressing or attaching means and the perforating punch. This difference in the mode of actuation has necessitated a material revision in the structural characteristics of the apparatus disclosed in the Hirszon patent noted hereinabove. It is, therefore, an object of the invention to provide a novel constructed shearing, pressing and punching mechanism embodying the novel features hereinabove noted.

Another object is to provide a novel cam assembly which, when actuated, operates upon associated parts in a predetermined sequence.

Another object is to provide, in an apparatus of the character described, a novel assembly of telescoped parts, each sequentially operable independently of one another.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention consists of certain novel features of construction, arrangement and combination of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportion, size and minor details of the structure may be made without departing from the spirit

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or sacrificing any of the advantages of the invention.

For the purpose of facilitating an understanding of my invention, I have illustrated in the accompanying drawings a preferred embodiment thereof, from an inspection of which, when considered in connection with the following description, my invention, its mode of construction, assembly and operation, and many of its advantages should be readily understood and appreciated.

Referring to the drawings in which the same characters of reference are employed to indicate corresponding or similar parts throughout the several figures of the drawings:

Fig. 1 is an elevational view of a simple form of reinforcing and punching apparatus embodying features of the present invention.

Fig. 2 is a vertical sectional view of the apparatus shown in Fig. 1, taken substantially on line 2—2 of Fig. 1.

Fig. 3 is a sectional view similar to Fig. 2, but showing parts of the apparatus in other positions occupied during operation thereof.

Fig. 4 is a sectional view similar to Fig. 2, showing the parts in still other positions assumed during operation.

Fig. 5 is a fragmentary view of a sheet, showing a patch of the kind provided by operation of the present apparatus attached thereto.

Before entering into a detail discussion of the structure and operation of the shearing, attaching and punching apparatus illustrated, it should be observed that the present disclosure is concerned with but a single patch forming and attaching mechanism, whereas, in actual practice, at least two and in some instances more of these mechanisms will be associated together, so as to provide a single sheet of paper with a plurality of reinforced punched holes. Inasmuch as the construction and operation of all of the mechanisms which may be joined in a single perforating and attaching machine embody the same structural characteristics, the present description will concern itself solely with the construction and operation of but one of the mechanisms.

Referring particularly to the Fig. 1 disclosure, each shearing, attaching and punching mechanism will be suitably mounted within a body 11, which may be cylindrical in shape and which is provided with a longitudinal bore or passageway 12 having an internal flange 13 adjacent to its lower end, so as to provide an internal shoulder 14. The body 11 may be supported in any suitable manner, so as to be held spaced from a die-

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plate 15 securely mounted in the base 16 of the apparatus. It is preferred that the die-plate 15 have an aperture 17 therein for a purpose to become apparent presently.

A foot plate 18 is secured in any suitable manner to the bottom face of the body 11, and it may have a projecting forward edge, indicated at 19, suitably tapered as at 21, so as to facilitate the ready insertion of a sheet of paper 22 between the foot plate 18 and the die-plate 15. A shoulder 23 or other stop means may be formed on the base 16 to limit insertion of the sheet 22 beneath the foot plate 18.

A cylindrical shearing knife 24 is mounted for free sliding movement within the passageway 12. The lower portion of the shearing knife 24 has its outside diameter reduced, as at 25; and is formed at its lower end with a shearing edge 26. The reduced diameter is of such size as to be guided through the opening defined by the internal flange 13 and to cooperate with a shearing opening 27 in the foot plate 18 when the shearing ring is moved downwardly a distance sufficient to carry its shearing edge 26 into the shearing opening 27. A coil spring 28, arranged in the space between the inside wall of the passageway 12 and the outside surface of the reduced diameter 25 of the shearing ring, has one end seated upon the shoulder 14 and its other end bearing against a shoulder 29 on the shearing ring 24. This spring normally holds the shearing ring in the elevated position illustrated in Fig. 2. A sleeve 31 is telescoped into the passageway 12, and its lower end rests against the top edge of the shearing ring 24. This sleeve projects upwardly a short distance beyond the top end of the body 11, and is provided for a purpose to be described presently.

A perforating punch 32 is mounted to have free sliding movement within the sleeve 31 and shearing ring 24. As best illustrated in Fig. 2, the perforating punch includes a flange 33 which normally sits against the bottom face of the sleeve 31 and is of such diameter as to slide freely within the internal bore 34 in the shearing ring 24. The flange 33 is located above the lowermost end of the perforating punch 32; consequently, said punch extends downwardly to a plane above the plane of the shearing edge 26 of the shearing ring 24. The uppermost end of the perforating punch 32 extends beyond the upper end of the sleeve 31, and it carries adjacent its upper end a flange 35, against which one end of a spring 36 is adapted to bear. The spring 36 is arranged around the projecting end portion of the perforating punch 32, as shown, and its other or lower end rests against the top surface of the sleeve 31. This spring 36 serves to maintain the perforating punch 32 in the position of elevation illustrated in Figs. 2 and 3.

A cylindrical pressing shoe 37 is fitted around the lowermost end portion of the perforating punch within the bore 34 of the shearing ring 24. The bottom face of said pressing shoe 37 normally is disposed below the bottom face of the perforating punch 32. For this purpose, the perforating punch 32 is provided with a flat spot 38, in which a pin 39 carried by the pressing shoe 37 operates. A spring 41 is disposed within the shearing ring 24, with its ends bearing against the perforating punch flange 33 and the pressing shoe 37, respectively, so as to hold the pressing shoe normally in the position illustrated in Fig. 2.

Before entering into a discussion of the various steps of operation effected upon manipulation of the apparatus, it should be observed that the

body 11 is provided, preferably immediately above the foot plate 18, with a transverse passage 42 through which a strip 43 of pressure-sensitive adhesive tape is threaded. This strip of tape may be carried in the apparatus in the form of a roll, which is intermittently unwound during machine operation, so as to advance the strip 43 through the body 11 in a step-by-step motion upon successive manipulation of the apparatus. The strip 43 is adapted to have portions thereof sheared therefrom, in a manner to be specifically described presently, by the shearing ring 24 and the portion of the strip remaining and passing out of the body 11 may be suitably disposed of such as, for example, by rewinding the same on a spool much in the manner illustrated in the Hirszon patent hereinbefore referred to.

Operation of the shearing, pressing and perforating apparatus is accomplished in the present instance by means of cam elements mounted firmly upon an oscillatably rotatable shaft 44. Obviously, the shaft 44 may be journaled in any approved manner so as to permit oscillatable rotation thereof upon manipulation of a handle or lever carried thereby, but not presently illustrated.

Referring again to the Fig. 2 disclosure wherein all of the parts of the apparatus are in their normal or inoperative positions, a cam 45, carried on the shaft 44, has an edge portion thereof in surface contact with the top face of the sleeve 31. When the shaft 44 is rotated in a clockwise direction, into substantially the position illustrated in Fig. 3, the cam 45 has been effective to depress the sleeve 31 and, consequently, the shearing ring 24 downwardly. When this occurs, the shearing edge 26 of the shearing ring 24 acts to shear out a circular patch 46 from the strip 43. Downward movement of the shearing ring 24 compresses the spring 28 and it should be obvious that, should the applied force acting on the shaft 44 be relieved, the spring 28 would return the parts to their normal positions. (Fig. 2.)

Continued rotation of the shaft 44 in a clockwise direction, following the shearing of a patch 46 from the strip 43, carries the cam 45 into substantially the position illustrated in Fig. 4. Upon referring to that figure, it will be observed that an auxiliary cam element 47, which is secured firmly in a predetermined position on one face of the cam 45, becomes effective to lower the perforating punch 32 from the elevated position illustrated in Fig. 3, into the depressed position illustrated in Fig. 4. When this occurs, the spring 36, which normally holds the perforating punch 32 elevated, is compressed, as well as the spring 41 associated with the pressing shoe 37.

The pressing shoe 37 has, of course, advanced in unison with the perforating punch 32 during initial downward movement of the perforating punch. This common advance of the two elements continues until the pressing shoe 37 encounters the sheared patch 46 and carries it downwardly into tight pressing face to face engagement with the sheet 22. At that time further downward movement of the pressing shoe 37 is arrested and the continued advance downwardly of the perforating punch 32 causes its perforating end to pass through the patch and sheet to thereby perforate the same. The applied force on the shaft 44 may then be relieved, whereupon the parts will return to the initial positions illustrated in Fig. 2. It is to be understood, of course, that manual or mechanical

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means (not shown) has been actuated to advance the strip 43 a sufficient distance through the transverse passage 42 to locate an unperforated area beneath the shearing ring 24, so that a second shearing, attaching and punching operation may be effected when the apparatus is again actuated.

Although a specific form of cam structure has been selected as the most feasible for operation of the apparatus illustrated, it should be understood that other cam means than that illustrated may be associated with the apparatus to effect the same or substantially the same sequence of operation, and that other modifications may be made in the details of construction of various parts of the apparatus without departing from the spirit of the invention or the scope of the appended claims.

Having explained the essential principles of the device, I claim:

1. In a device for severing and attaching a reinforcing piece to a sheet and perforating the attached piece and sheet, a body having a passageway therethrough, an internal shoulder at the lower end of said body, a shearing ring telescoped in the passageway, a spring cooperating with the shoulder to normally hold the shearing ring elevated and afford cushioning means therefor, a sleeve telescoped in the passageway seated upon said shearing ring, a pressing ring telescoped into the shearing ring, a perforating punch telescoped through the sleeve and pressing ring, spring means arranged between the sleeve and perforating punch to normally hold the punch elevated with its lower end above the

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bottom plane of the shearing ring, a spring surrounding a portion of the perforating punch acting on one end of the pressing ring to maintain its other end below the plane of the bottom of the perforating punch, and cam means actuable to initially urge the shearing ring downwardly, then move the pressing ring and perforating punch downwardly and finally advance the perforating punch downwardly relative to the pressing ring.

2. In a device for severing and attaching a reinforcing patch to a sheet and perforating the attached piece and sheet, a vertically disposed cylindrical body, a shearing ring in the body, yieldable means normally holding the shearing ring in an elevated position, a perforating punch, a sleeve surrounding a portion of the punch seated on the shearing ring, means between the sleeve and punch normally holding the punch elevated, a pressing ring telescoped on and resiliently connected to the punch within the shearing ring, means to urge the shearing ring downwardly to shear a patch from a supply strip of adhesive coated material, and separate means to carry the pressing ring downwardly to attach the patch onto a sheet located therebeneath and to then carry the punch downwardly to perforate the patch and sheet.

References Cited in the file of this patent

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Number	Name	Date
2,583,944	Hirszon	Jan. 29, 1952