

[54] SHEET INTERCONNECTING DEVICE

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402/1

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[58] Field of Search 40/301, 302; 402/1;
24/206 A, 208 A, 108, 150 FP, 218, 155 D,
155 BB, 216, 217

[56] **References Cited**

UNITED STATES PATENTS

R15,212	10/1921	Mann.....	24/218
352,363	11/1886	Shipman.....	24/217
947,976	2/1910	McComb.....	402/1
1,011,911	12/1911	Burgess.....	40/302
1,143,834	6/1915	Kimsey.....	24/217 X
1,347,868	7/1920	Nichols.....	40/302
1,390,342	9/1921	Delay.....	40/301
1,854,843	4/1932	Janes.....	24/216
1,900,601	3/1933	Felder.....	24/108 X
2,162,275	6/1939	Stanchfield.....	24/108
2,497,305	2/1950	Isaac et al.....	24/217

FOREIGN PATENTS OR APPLICATIONS

287,056 9/1915 Germany 24/218

Primary Examiner—Donald A. Griffin

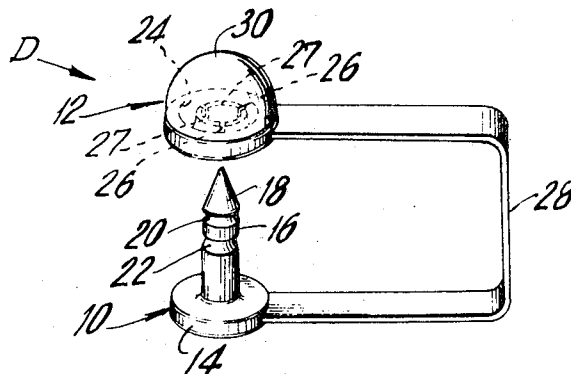
Attorney—Morris Kirschstein, Bertram Ottinger, Esq.
et al.

[57]

ABSTRACT

A device for interconnecting sheets of paper, plastic film, cloth or the like. The device includes a first member which has a shaft with a tapered head at one end and a broad base at the other. The head is adapted to penetrate the sheets. The device further includes an annular second member with resilient inwardly extending gripping means, so that when the second member is slipped down the shaft, which has penetrated several sheets, and punched holes therethrough with the second member acting as an anvil and the first member acting as a punch, the gripping means engages the shaft, thereby coupling the two members while holding the sheets on the shaft pressed between the second member and the base of the first member. The ends of a yoke are permanently connected to the two members in order to maintain them as a unit, even when the members are not coupled.

4 Claims, 8 Drawing Figures



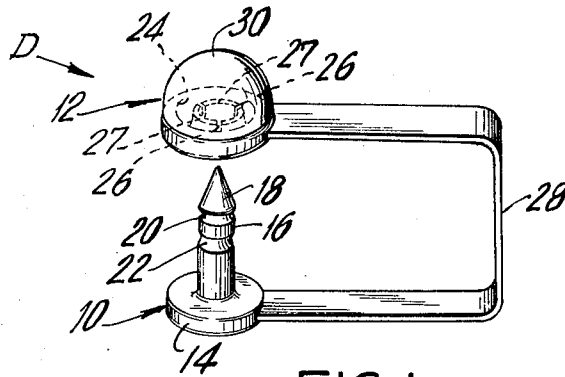


FIG. 1

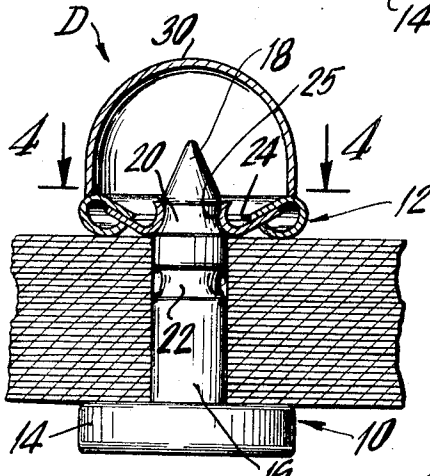


FIG. 3

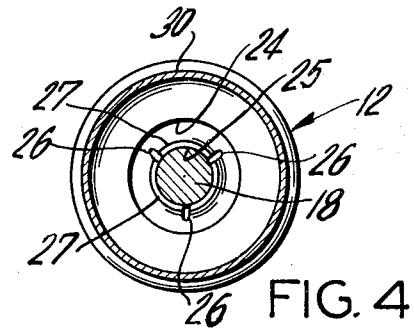


FIG. 4

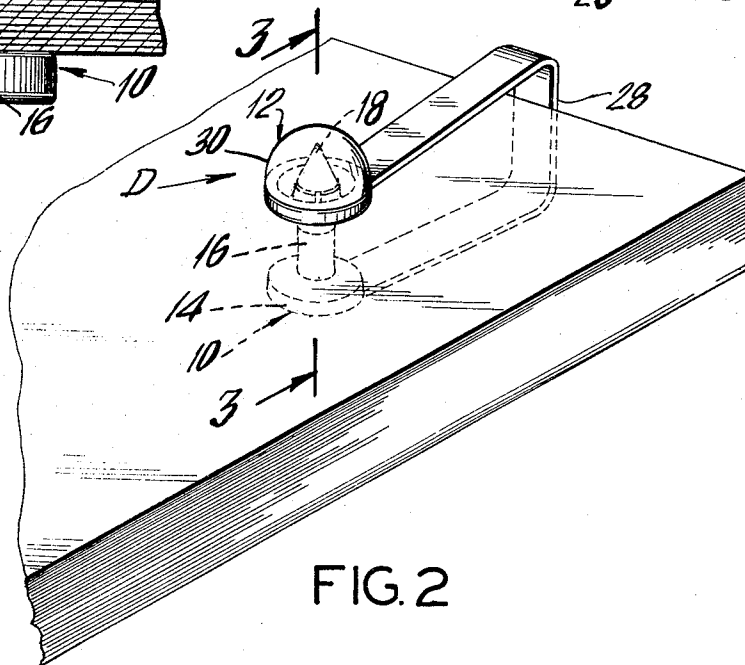


FIG. 2

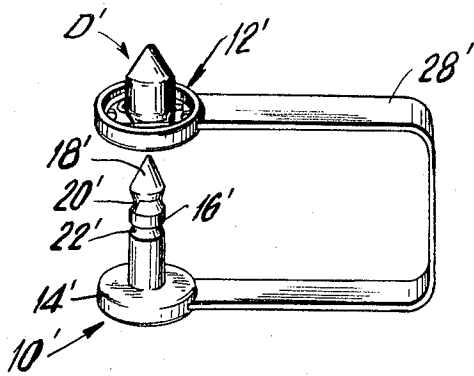


FIG. 5

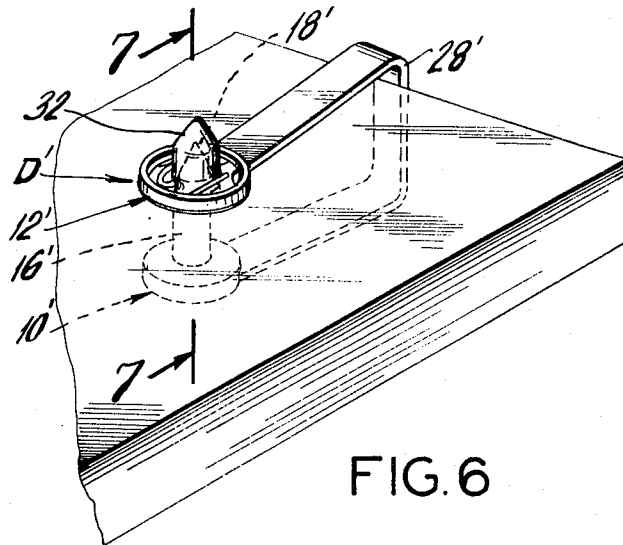


FIG. 6

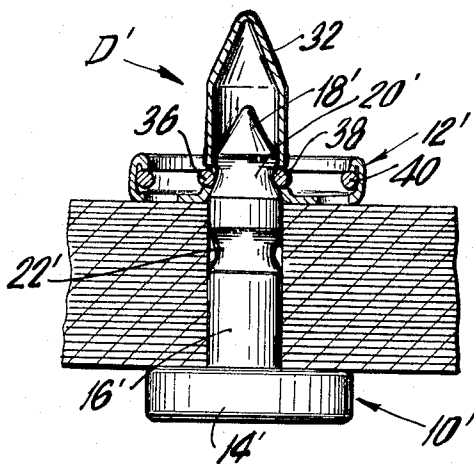


FIG. 7

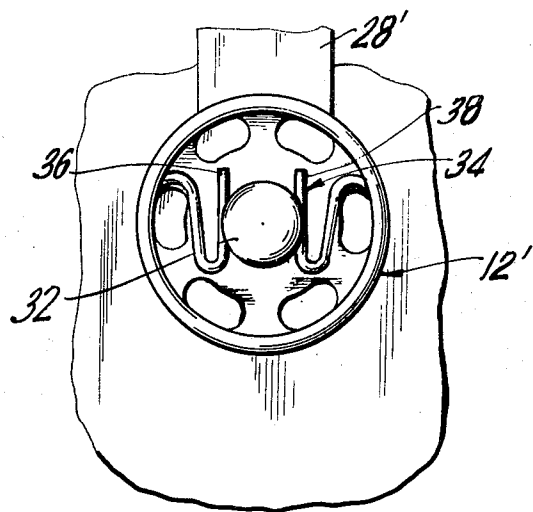


FIG. 8

SHEET INTERCONNECTING DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

A device for interconnecting sheets of paper, cloth, plastic film and the like.

2. Description of the Prior Art

In the prior art, various techniques have been used for fastening together a number of sheets of material, such as paper. In one technique, paper sheets are stapled together. Removal of the staples and/or substitution of other staples may damage the paper. The removal of staples as well as the presence of loose removed staples constitutes a safety hazard.

In another technique, the paper either has holes pre-punched therein or holes are punched in a group of paper sheets and the paper then is threaded on a ring, which may be part of a loose-leaf binder; or McGill fasteners or Acco fasteners are inserted through the holes. The rings are bulky; the McGill and Acco fasteners frequently cut handlers of the assembled sheets.

In still another technique, tongues of paper are formed and threaded through slits cut in the sheet to provide a paper lock; but this requires a special tool and the lock comes apart too easily.

SUMMARY OF THE INVENTION

1. Purposes of the Invention

It is an object of the invention to provide a convenient device for fastening together a group of paper sheets or the like which is not subject to the foregoing drawbacks.

It is another object of the invention to provide a device of the character described which can be removed easily from fastened-together sheets with minimal damage to the sheets and with no damage whatsoever to the device, which thus can be reused repeatedly.

It is another object of the invention to provide a device of the character described through the use of which sets of papers can be secured to one another with great rapidity and which presents no particular manual problem, even to persons having little dexterity.

It is another object of the invention to provide a convenient method of fastening together a group of sheets of paper or the like by forming holes in the sheets at the time that the sheets are being secured to one another by a fastening device such as described herein.

Other objects of the invention in part will be obvious and in part will be pointed out hereinafter.

2. Brief Description of the Invention

According to this invention a device for fastening together a plurality of sheets of paper or the like includes a first member having a shaft with a tapered head and a broad base. The head is designed to pierce the sheets. A portion of the shaft adjacent the head has a circumferential groove therein. A second member, which is of annular configuration, is provided with resilient inwardly extending means for reception and gripping of the shaft when the shaft is threaded through the second member. Particularly good interengagement between the members is obtained when the gripping means is lodged in the groove. The shaft can have additional circumferential grooves for receiving the gripping means so that the distance between the second member and the base of the first member can be varied to accommodate different numbers of sheets to be fastened together. Shafts of different lengths can be provided for

securing together widely varying numbers of sheets. The gripping means is capable of firmly engaging the shaft between grooves to accept intermediate numbers of sheets. The shaft and annular member cooperate as a punch and die to form holes in the fastened sheets. Preferably, a resilient yoke is employed to tether the head of the first member to the annular second member even when the members are not coupled. Furthermore, the second member can be so shaped as to cover the tapered head of the shaft whereby to prevent injury to a person handling the device.

The invention accordingly consists in the feature of construction, combinations of elements, arrangements of parts and series of steps which will be exemplified in the devices and method hereinafter described and of which the scope of application will be indicated in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings, in which are shown various possible embodiments of the invention:

FIG. 1 is an exploded perspective view of a fastening device embodying the invention, the same being illustrated in idle condition with the first and second members separated;

FIG. 2 is a perspective view showing the device being used to fasten together a plurality of sheets of paper;

FIG. 3 is an enlarged fragmentary sectional view taken substantially along the line 3—3 of FIG. 2;

FIG. 4 is a sectional view taken substantially along the line 4—4 of FIG. 3;

FIGS. 5 and 6 are views similar to FIGS. 1 and 2 of a device embodying a modified form of the invention;

FIG. 7 is an enlarged fragmentary sectional view taken substantially along the line 7—7 of FIG. 6; and
FIG. 8 is a top view of the device shown in FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now in detail to FIGS. 1—4, the reference D denotes a device constructed in accordance with the present invention and including as its principal components a first member 10 and a second member 12.

The first member 10 has a circular flat broad base 14. Such shape is mentioned by way of example only. The particular shape is not critical, nor need the undersurface of the base be flat; however, it is preferred that the upper surface be flat. Perpendicularly extending from the upper surface of the base is a shaft 16. The distal end, i.e., head, 18 of the shaft 16 is tapered to the point so that it is capable of readily piercing a set of sheets of paper, plastic film, cloth or the like. The point need not be needle-sharp; it has been found that if only a few sheets are to be fastened together by the device, as usually is the case, the point will function satisfactorily if rounded somewhat, even to a radius equal to that of the shaft. The shaft illustrated is circular in cross-section so that the head 18 is of conical shape. If the shaft is of any other cross-section, e.g., square, the head is correspondingly shaped, i.e. pyramidal.

A circumferential groove 20 is formed on the shaft 16 adjacent the head 18. An additional circumferential groove 22 or grooves may be provided in spaced relationship along the length of the shaft for a reason that will be explained later.

The second member 12 is of annular configuration with a central hole 24 therein. Conveniently, the mem-

ber 12 is formed from sheet metal and is circular in plan, the circumferential edges thereof being rolled under as shown in FIG. 3, both to provide a safe rounded exterior and to hold the element next to be described.

Said annular second member has a resilient inwardly extending gripping means located in the central hole 24. In the embodiment of the invention here being described, the gripping means constitutes a disc of springy material, e.g., spring metal, the circumferential zone of which is held between the undersurface of the member 12 and the rolled under peripheral edge thereof. The center of the disc has an opening 25 therein. Radial slots 26 extend a short distance outwardly from the opening 25 to subdivide the zone surrounding said opening into radially inwardly extending cantilevered leaves 27. The tips of the cantilevered leaves are only slightly spaced from one another and are turned upwardly as best shown in FIG. 3. The configuration of the leaves is such that they conjointly define a split tube of rather squat height. Due to the fact that the disc, and therefore the grooves, are of a springy material, the split tube formed from the leaves is resiliently constrictive in nature, i.e., will perform a gripping function if there is thrust into the same a shaft, such as the shaft 16, the external diameter of which somewhat exceeds the internal diameter of the tube. Thereby the split tube acts as a gripping means when the shaft 16 is threaded therethrough.

The rounded ends of the leaves 27 that define the split tube have heights such that they will be nicely received within the groove 20, snapping into said groove when they reach it as the second member moves axially down the shaft from the head 18. As will be readily apparent, the leaves can snap into any one of the grooves if there are more than one. After the ends of the leaves are received in any one of the grooves, they can be disengaged therefrom simply by applying sufficient force to the annular member to overcome the retention force of the resilient leaves. This will enable the annular member to be moved further along the length of the shaft or to be withdrawn from the shaft when it is desired to disengage the members from one another.

Shafts 16 can be furnished in various lengths, each length being designed to accommodate a specific range of thickness of a stack of sheets. The different grooves on a shaft, if more than one groove is included, are intended to accomplish the similar function of enabling the device to accommodate different ranges of thickness of stacks of sheets.

It should be noted that the resilient leaves constrictively grip the shaft even between the grooves to engage the shaft with sufficient firmness to maintain a compressive force on a group of papers compressed between the second member and the upper surface of the base 14, which does not have a thickness that precisely corresponds to the distance between the annular member and the base when the ends of the leaves are disposed in any given annular groove. Thus, the device has great adaptability as to the conjoint thicknesses of any number of sheets which may be desired to be fastened together.

Preferably means is included to join the two members in such a fashion as to constitute a unit so that the members will not become so widely separated from one another that either one of the members can be lost, bearing in mind that these members are quite small.

However, any means for joining the two members must be such as to enable the two members to be manipulated with relative freedom with respect to one another for the purpose of coupling. To this end such means constitutes a tether 28 of relatively flexible material having one end permanently connected to the other member. The tether may be composed of any suitable flexible material, such for example as a plastic monofilament or a plastic cord or, as shown herein, a yoke of a thin strip of resilient metal, such for instance as steel or a metal which is similar to the metal from which the members are made, in the event said members are made from metal.

Although the tether may be limp as is accomplished when the tether is fashioned from a plastic monofilament or a plastic string, the tether also can be self-form-maintaining, which is true of the tether illustrated in FIGS. 1-4. This particular tether is of U-shaped configuration with the ends, i.e. tips, of each of the arms joined, as by welding, to the members 10, 12 which in the shown form of the invention are of metal. The shape of the yoke is that of a U with the arms joined to the base by square corners and with the arms sufficiently long for the two members 10, 12 to engage sheets of paper far enough in from the margin as may be desired by a user. Indeed it is for this purpose that the aforesaid corners of the yoke are square, thus enabling the full length of the arms to extend between the located position of the two members on a stack of paper sheets and the adjacent margin of the sheets, which may be located at the base of the yoke. The self-form-maintaining yoke holds the two members in alignment.

It will be observed that the tapered head 18 of the shaft can be, and, indeed, in some forms of the invention is, rather sharp. Some consumers might consider that a potential hazard is created by a sharp tip; hence pursuant to an optional feature of the invention suitable means is provided to protect the user against accidental harm that could arise from the presence of a sharp point. Said means assumes the form of a protective cover 30. The cover constitutes a dome of generally semi-spherical configuration which is located above the head 18 when the members are coupled, the dome being affixed to the upper surface of the annular member 12 in such position as to define between said upper surface and the interior surface of the dome a space in which the head can be freely received without any interference.

To use the device, a person assembles a group of sheets to be fastened to one another and uncouples members 10, 12 from one another if they happen to have been previously coupled. Then, using the base 14 as a manipulative element, he places the tapered head 18 of the shaft 16 against an outermost surface of an outermost sheet, either on the top or bottom of the stack, at a distance spaced inwardly from the margin of the stack of sheets which does not exceed the distance permitted by the tether 28 and which is a distance that is acceptable to the person. Next, again using the base 14 as the manipulative element, he pushes the tapered head 18 into and through the group of sheets. If the head is pointed, it readily will pierce a fairly thick group of sheets and usually will urge out of its path sufficient paper to permit passage of the shaft 16 through the stack.

Preferably the annular member 12 is placed on the side of the group of sheets opposite the side from which the shaft enters the stack, and with its opening 24 in line with the shaft. Thereby as the shaft exerts localized pressure on the sheets in the group such pressure will be transmitted to the underside of the annular member which thereupon will function as an anvil in cooperation with the shaft, acting as a die, to punch out of the sheets in the group discs of a size substantially matching the diameter of the shaft. These discs will be forced through the annular member and into the dome 30 if such an element is incorporated in the device D.

Where the device is to be used to fasten together only a few sheets of paper, the head 18 need not be sharply pointed; it will suffice if it is simply tapered and even, optionally, if it is only rounded. In this case the two members 10, 12 are arranged on opposite sides of a group of sheets with their axes in coincidence so that when the two members are pressed towards one another, they will shear out discs of paper from the sheets to leave registered openings, through which the head of the shaft and then the shaft penetrates the sheets, with the head ultimately being resiliently engaged by the gripping means aforesaid.

It should be pointed out that actual use of the device has shown that comparatively little effort is required to force the two members into interengagement with one another in the manner described above and just as little effort is needed to disengage them from one another, so as to restore them to uncoupled position.

It will be appreciated that the present invention is concerned with the provision of two interengageable members, one of which is characterized by the presence of a base and shaft and the other by the presence of an annular configuration with resilient internal gripping means. The particular design and configuration of the two members is not critical. Specifically, the annular member can include gripping means that is structured quite differently from the gripping means embodied in the device D constituting the first embodiment of the invention. That gripping means was of a constrictive nature.

In FIGS. 5-8 there is illustrated a device D' which is essentially similar to the device D already described in detail above, but differs therefrom in the construction of the annular member 12'. Referring in detail to said figures, the member 12' is fabricated from sheet metal in the shape of a shallow dish with low upright sides around the periphery thereof (see FIG. 7).

Said member 12' is pseudo annular, in other words, it functions as an annular member but is not truly annular, due to the fact that instead of having a through opening, such as the opening 24 described in connection with the device D, it includes a blind central well 32. The closed end of the well is uppermost and is shaped to fully receive the shaft 16' and the conical head 18' of said shaft. The open end of the well is around a central opening in the bottom of the member 12'. The purpose of the well 32 is the same as that of the dome 30 in the first described form of the invention, to wit, to protect a user against potential hazard that may be created by the point 18' during coupling of the two members 10' and 12' when they are used to fasten sheets together.

The gripping means utilized in connection with the device D' differs from that used in connection with the device D. Thus, in said device D the gripping means

was constrictive in nature, that is to say it was generally circular and assumed, when idle, a diameter less than the diameter of the shaft 16. However, the invention functions satisfactorily with gripping means of other constructions, an excellent example of which is the gripping means incorporated in the device D'. The gripping means of this latter device constitutes a length 34 of spring wire, e.g., spring steel, which is shaped to include at least two portions (when only two portions are used they are opposed) that are spaced apart from one another by a distance which is less than the diameter of the groove 20'. These two portions are shown as straight and parallel to one another and are denoted by the reference numerals 36, 38. The portion of the wire connecting the two straight portions 36, 38 includes an arcuate coverd reach 40 which is captively held in the second member 12' beneath the rolled over segments at the upper edges of the low sides of said member 12'. This arcuate portion of the wire 34 has an approximately circular configuration which, when idle, has a diameter in excess of the diameter of the annular member 12' so that when said circular portion is squeezed to a smaller diameter, inserted in the open top of the member 12' and released, such portion will spring out to engage the inner surfaces of the lower sides of the member 12' below rolled over top segments thereof and thereby be captively held in place so that the wire 34 in effect becomes functionally unitary with the member 12'. With the wire 12' thus captively retained, the portions 36, 38 are in idle, i.e., relaxed, condition opposed and substantially parallel to one another but are spaced apart from each other, whereby to be prepared to admit the tip of the tapered head 18' when the two members are coupled for holding together sheets of paper.

In use, the shaft 16' of the member 10' is caused to penetrate a stack of paper sheets while the annular member 12' is held at the opposite side of the stack. After the head of the shaft has penetrated the sheets it will pass between the parallel spring wire portions 36, 38 to spread them apart until the spring wire portions reach the groove 20' whereupon said wire portions will snap into the groove so as to hold the two members in coupled relationship while at the same time pressing together the sheets of paper caught between the base 14' and the second member 12'.

The well 32 is deep enough to receive pieces of paper which are punched out of the paper sheets by punch-and-die cooperation of the shaft 16' and the well 32. In addition, it should be pointed out that by having the well 32 sufficiently deep as illustrated, the member 12' can be pressed down further than the points at which the spring portions 36, 38 engage the groove 20'. In lower positions, the pressure exerted by the spring portions on the ungrooved parts of the shaft suffices to hold two members to one another with enough firmness to maintain them in coupled relationship so that they can act as an interengaging device for a stack of papers.

As in the case of the device D, additional circumferential grooves 22' can be provided at a lower point or points on the shaft 16' for engagement with the wire portions 36, 38, the well 18' being deep enough to permit entry of the shaft into the same to an extent sufficient to enable the two members 10', 12' to be coupled with any desired number of sheets compressed therebetween.

It will be understood that the member 12' is annular in effect inasmuch as the well 18' does not interfere with the threading of the shaft 16' into the mouth of the well which is located at the bottom of the member 12'.

It thus will be seen that there are provided devices which achieve the various objects of the invention and which are well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the embodiments above set forth, it is to be understood that all matter herein described or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A device for fastening a plurality of sheets of paper or the like together, said device comprising:
 a first member having a head, a base having a flat surface, and a shaft perpendicularly extending from said flat surface of said base, the distal end of said shaft being pointed to pierce said sheets,
 an annular member, the opening of which receives the pointed end of said shaft,
 said shaft having intermediate its distal end and the base at least one annular groove therein the cross-section of which in the plane of the axis of said shaft is rounded and concave at its outwardly facing side, the diameter of said shaft exclusive of the groove or grooves being uniform, and
 resilient gripping means extending into the opening of said annular member, said resilient gripping means having opposed portions which are spaced apart by a distance less than the diameter of the shaft so that said gripping means will engage said shaft when said shaft is thrust through the opening to couple the members whereby the members will fasten together sheets of paper between the second member and the base of the first member,
 said gripping means having a cross-section in the plane of the axis of the opening of the annular

member which is rounded and convex at its inwardly facing side,

the curvatures of the facing surfaces of the groove and gripping means being configured for mutual interengagement so that when the resilient gripping means is seated in the groove it can be readily disengaged therefrom by a relative axial force applied to the base and annular member so that while the resilient gripping means is in the groove maximum surface contact between the gripping member and the groove, and hence maximum engagement therebetween, will be obtained,

a tether having ends, one end being permanently joined to the first member and the other end being permanently joined to the annular member to prevent the two members from being widely separated, and

a protective cover connected to the annular member and arching over the annular opening therein on the side of said annular member remote from the side through which the pointed tip of the base is inserted through the opening in the annular member, said cover being deep enough in a direction perpendicular to the plane of the annular member to receive pieces of paper which are punched out of paper sheets pierced by the first member and fastened together by said first member and annular member.

2. A device as set forth in claim 1 wherein there is at least one additional circumferential groove located between the first-mentioned groove and the base of the first member, said groove having a configuration the same as that of the first groove.

3. A device as set forth in claim 1 wherein the tether is resilient.

4. A device as set forth in claim 3 wherein the tether is of U-shaped configuration with straight arms and a straight base joined by substantially square corners.

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