United States Patent [19]

O'Connell

[11] **3,827,111**

[45] **Aug. 6, 1974**

[54] **FASTENING MEANS FOR DETACHABLY SECURING TOGETHER MATING ENDS OF A BINDER RING CONSTRUCTION AND THE LIKE**

[76] Inventor: **James P. O'Connell,** Three Rosemont St., Malden, Mass. 02148

[22] Filed: **Dec. 28, 1971**

[21] Appl. No.: **212,903**

[52] **U.S. Cl.** ..... **24/230 CF,** 402/20, 402/36

[51] **Int. Cl.** **B42f 3/04**

[58] **Field of Search** ..... 402/20, 31, 34, 36; 24/230 CF, 230 F, 223

[56] **References Cited**

UNITED STATES PATENTS

656,568	8/1900	Noble	402/20
808,248	12/1905	Morden	402/27
833,458	10/1906	Hausherr	24/230 CF X
856,480	6/1907	Long	24/230 CF
876,474	1/1908	Morden	402/20
901,076	10/1908	Dawson	402/39
3,270,749	9/1966	O'Connell	402/20

FOREIGN PATENTS OR APPLICATIONS

378,692	7/1923	Germany	402/34
98,804	4/1923	Switzerland	402/34

Primary Examiner—Jerome Schnall
Attorney, Agent, or Firm—Munroe H. Hamilton

[57] **ABSTRACT**

Interlocking ring sections detachably secured together and releasable by a simple thumb pressure movement are formed at opposite ends of a binder ring construction to provide for conveniently joining the ends together and loosely holding sheets, cards, notebook paper and similar articles. The interlocking sections include a receiver section and a complimentary keying ring section. A flexing tongue yieldably supported in the receiver section prevents accidental disengagement and yet may be moved from a positive locking position into a released position by a simple thumb pressure. When combined with a pair of rotatably ring shafts in fixed and centrally located positions thereon, the interlocking ring sections are operable to open and close other pairs of mating ring sections supported on the rotatable ring shafts at outer ends thereof. Torsion forces of significant magnitude generated in each of the rotatable ring shafts in opposed relationship to one another when the centrally disposed interlocking ring sections are closed operate to hold mating ends of outer pairs of conventional ring sections against one another in tightly compressed relationship without requiring hand manipulation.

1 Claim, 25 Drawing Figures

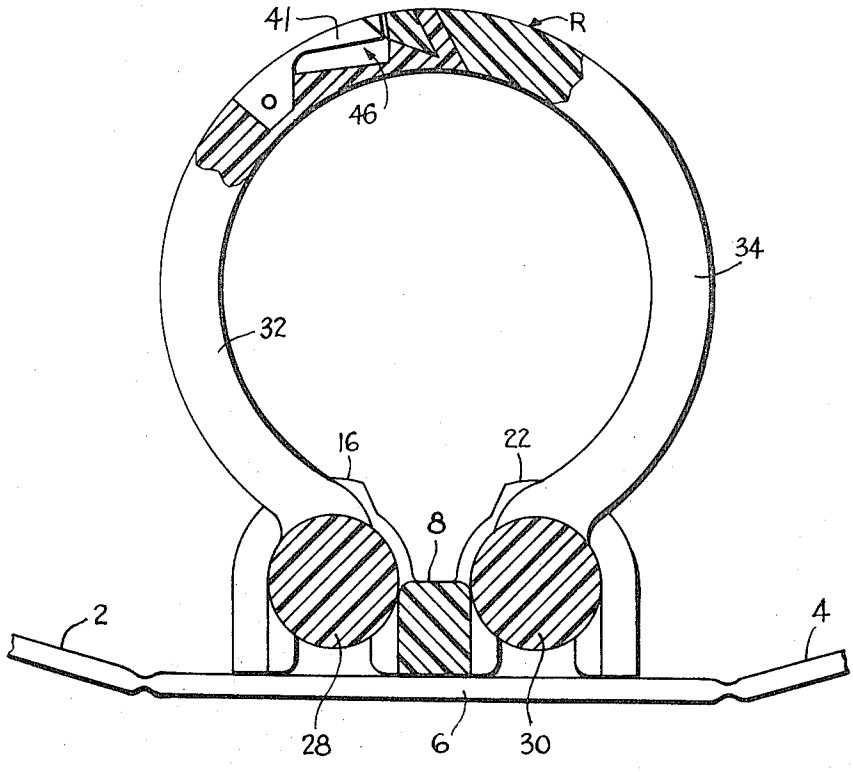


FIG. 1

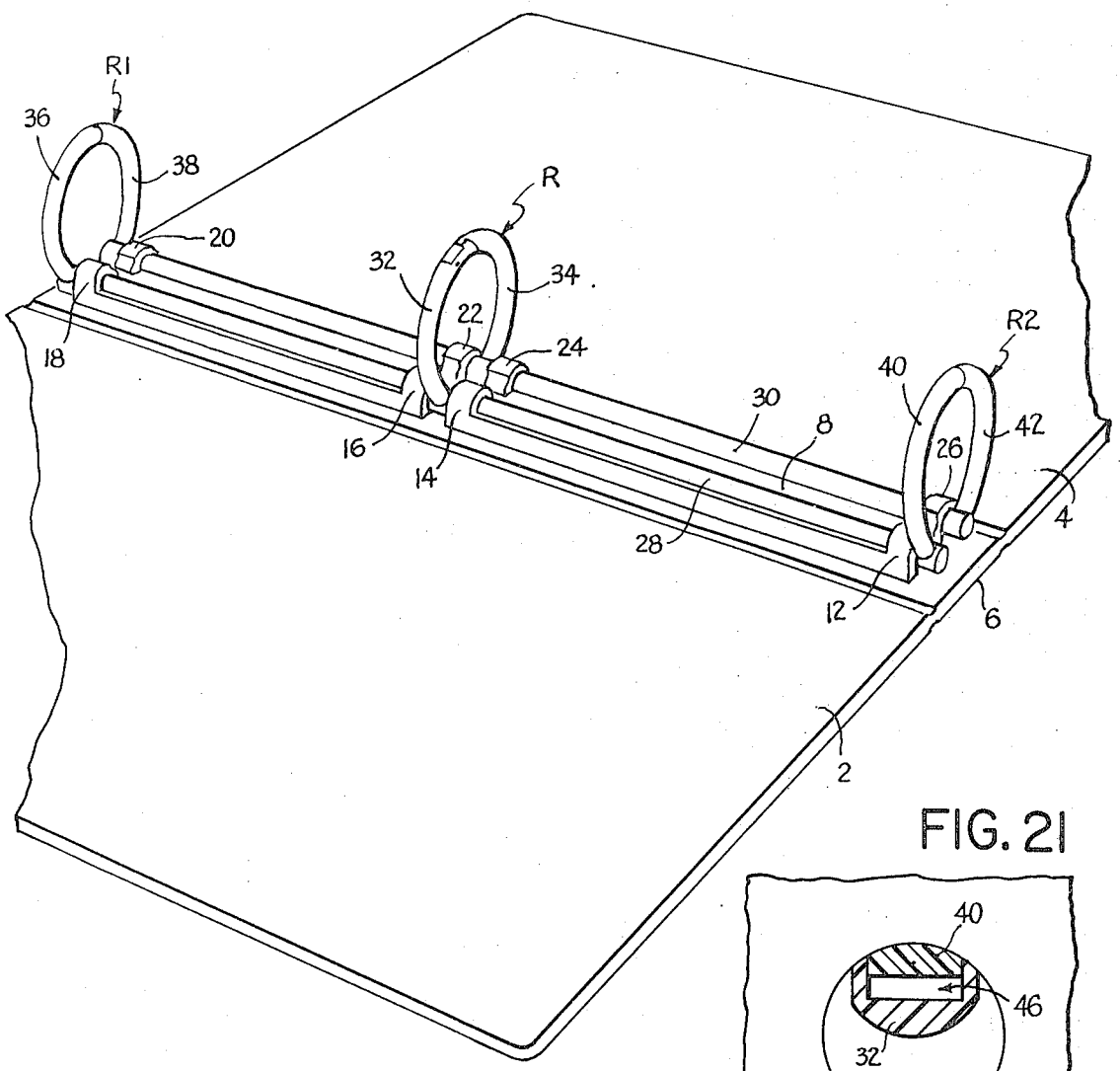


FIG. 21

INVENTOR
JAMES P. O'CONNELL
BY Munson H. Hamilton
ATTORNEY

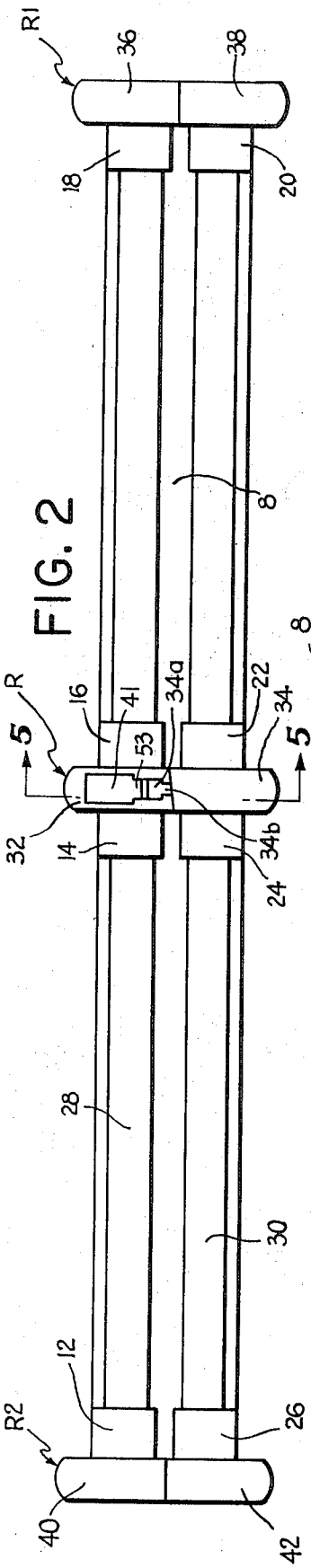


FIG. 2

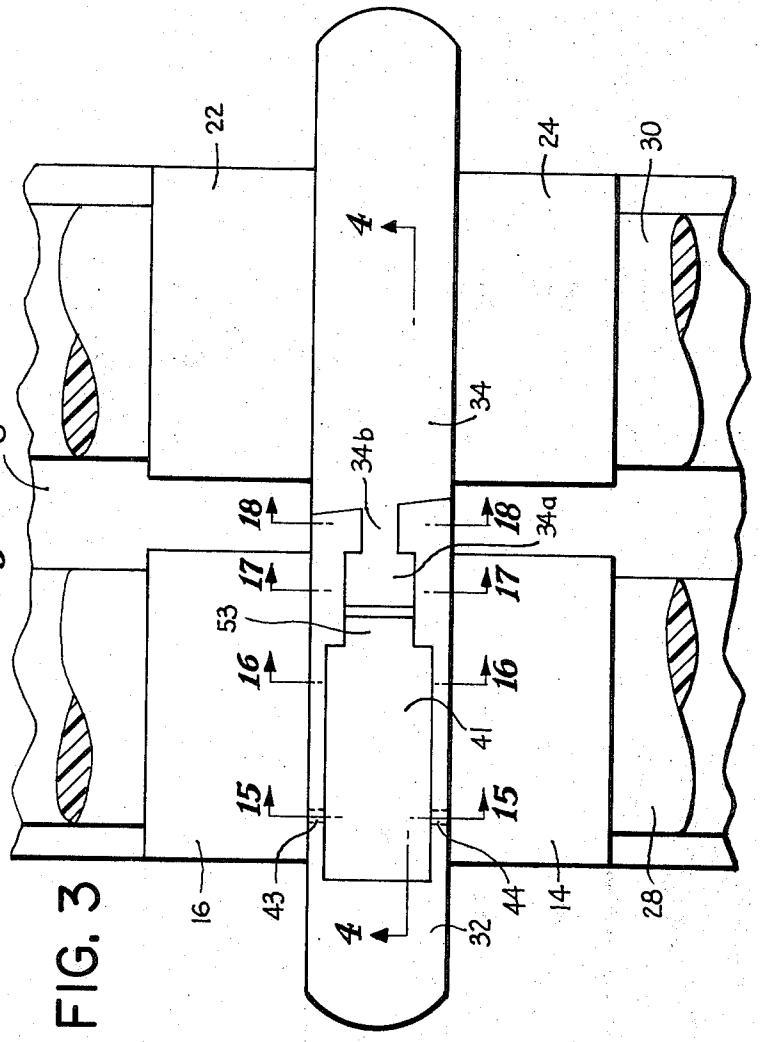
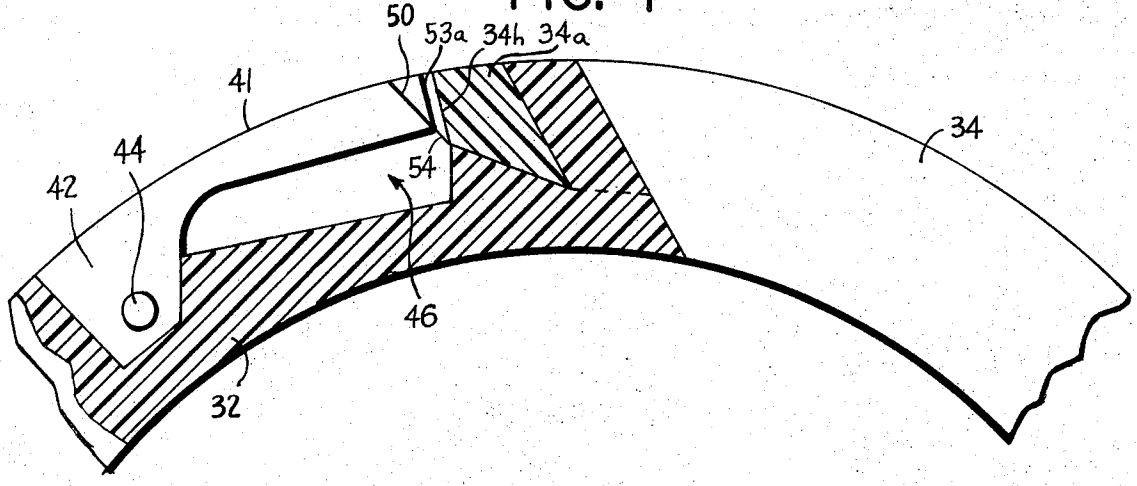


FIG. 3

INVENTOR
JAMES P. O'CONNELL
BY Thomas D. Hamilton
ATTORNEY

FIG. 4



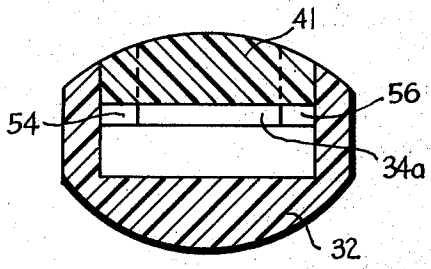


FIG. 16

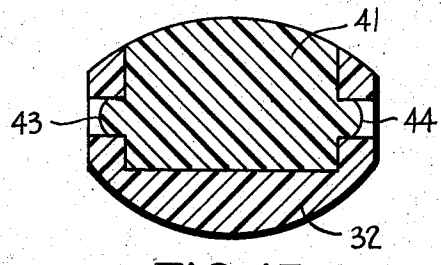


FIG. 15

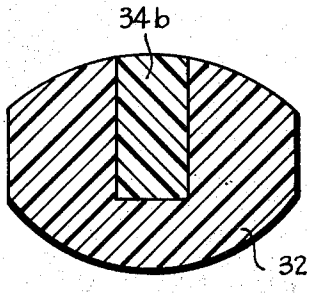


FIG. 18

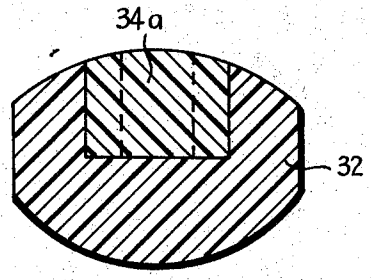


FIG. 17

INVENTOR
JAMES P. O'CONNELL
BY Thomas H. Hamilton
ATTORNEY

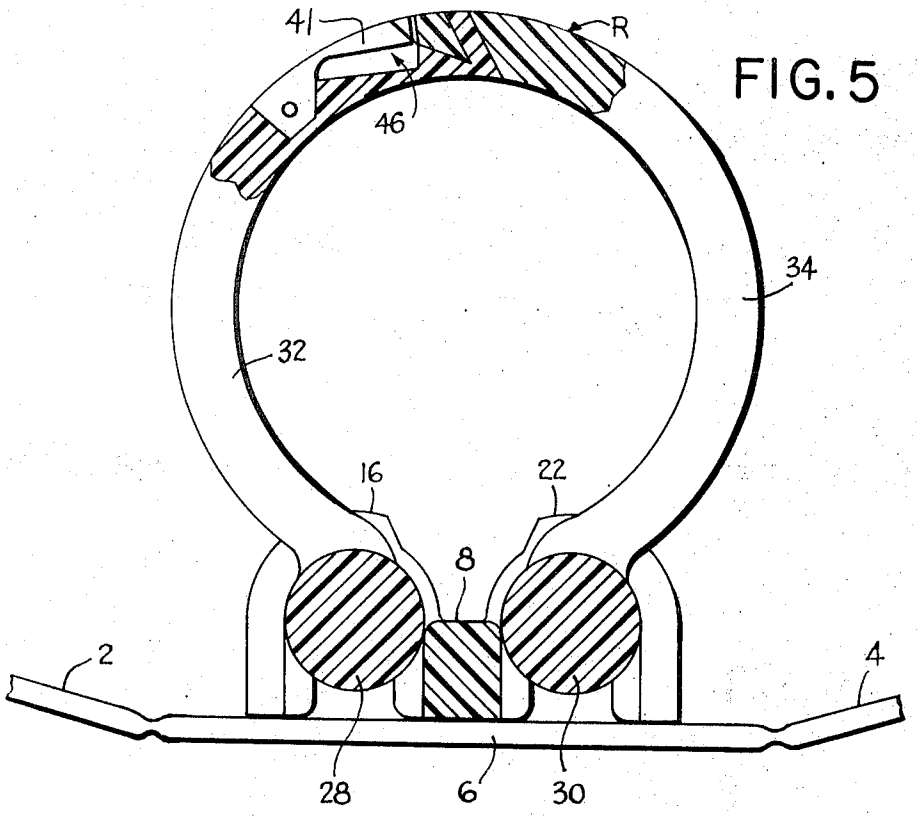


FIG. 5

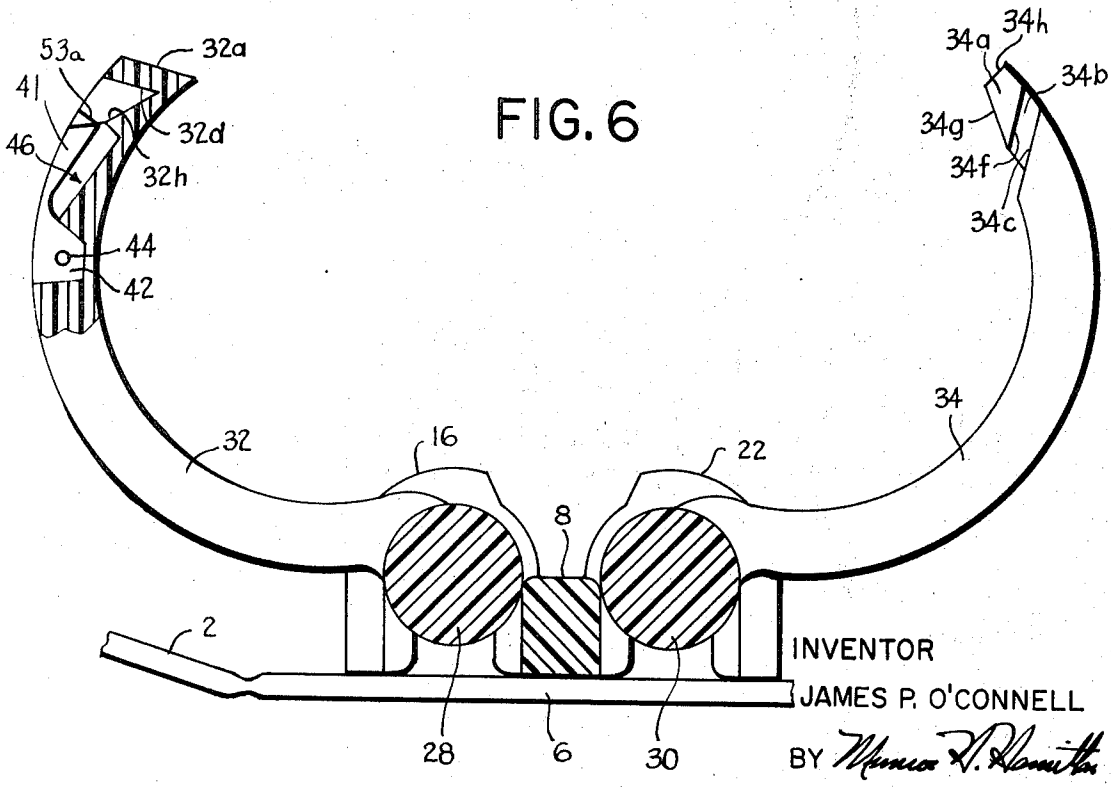


FIG. 6

INVENTOR
JAMES P. O'CONNELL
BY Monroe D. Hamilton
ATTORNEY

FIG. 7

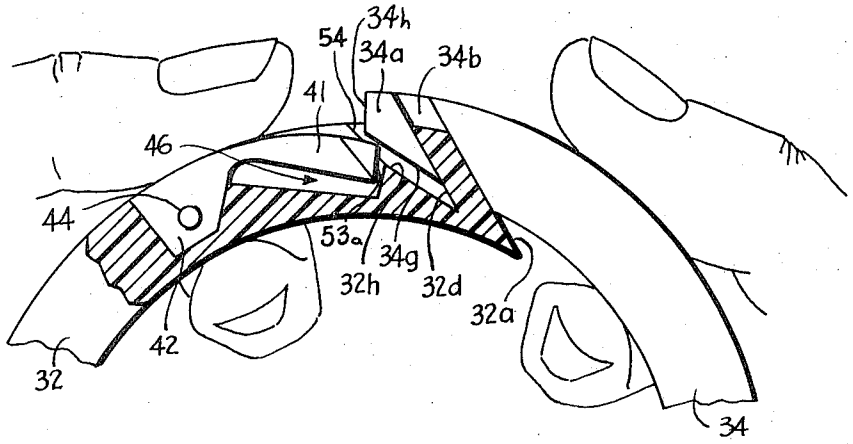
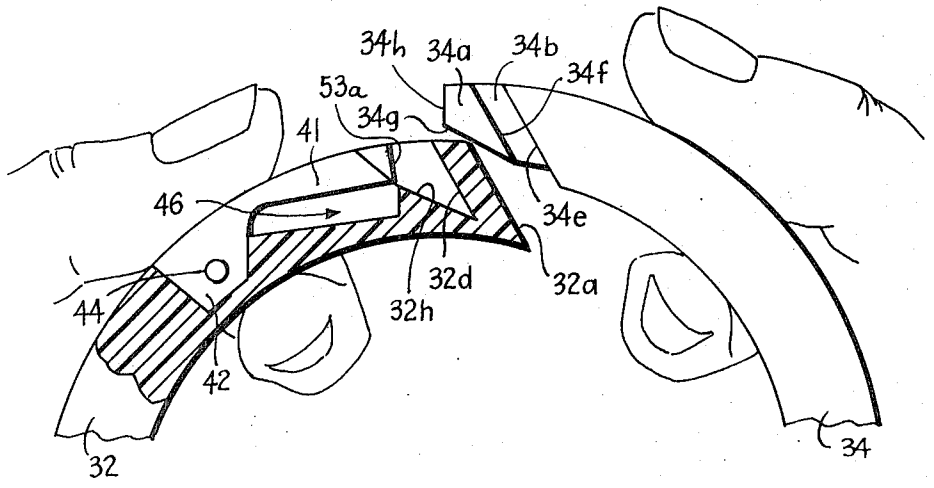


FIG. 8



INVENTOR
JAMES P. O'CONNELL
BY Thomas H. Hamilton
ATTORNEY

FIG. 9

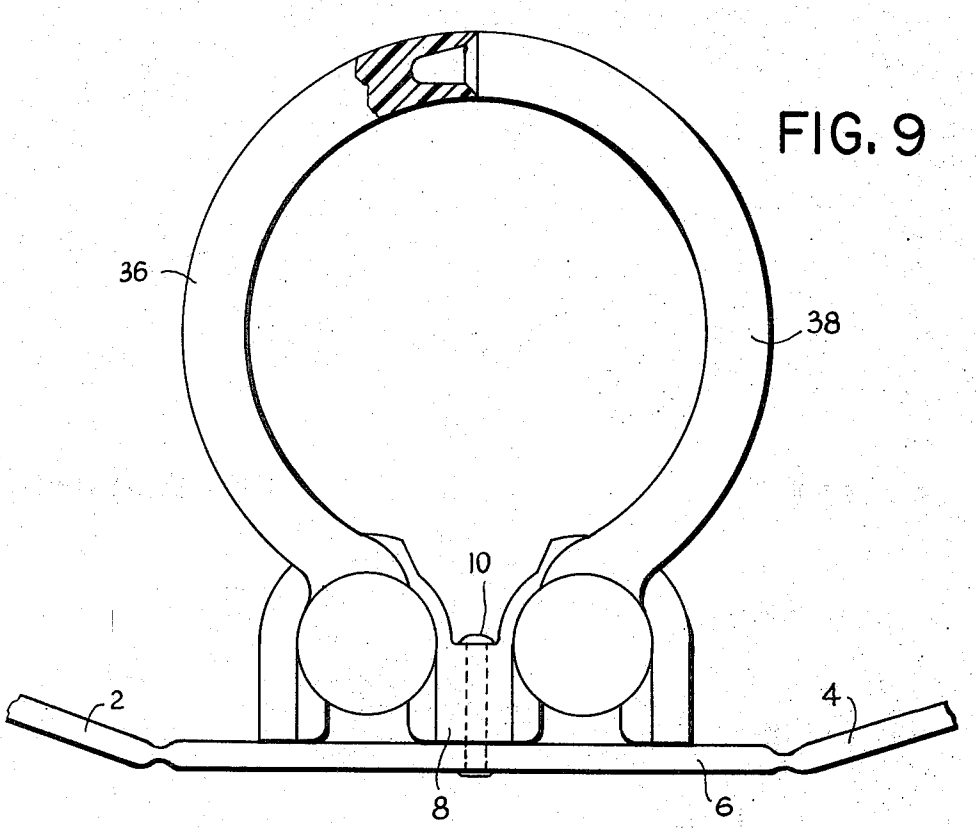
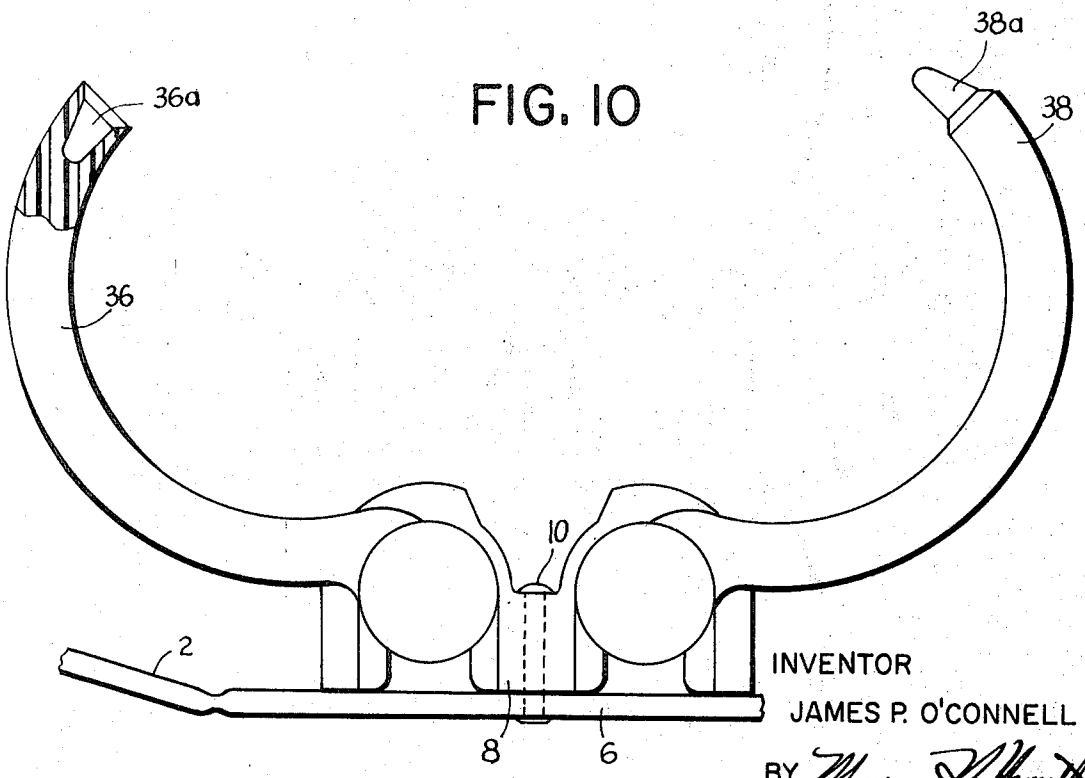


FIG. 10



INVENTOR
JAMES P. O'CONNELL
BY
ATTORNEY

FIG. 12

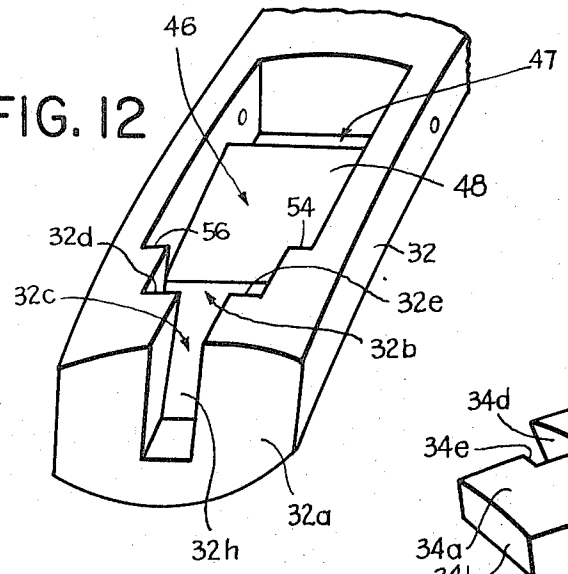


FIG. 11

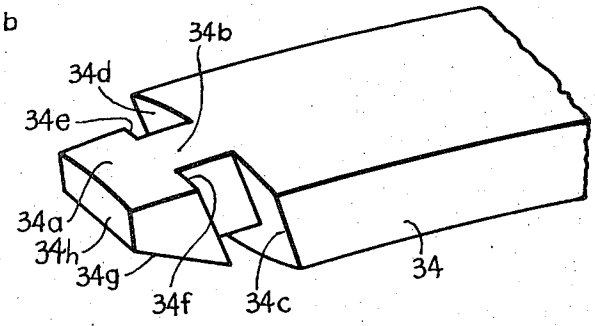


FIG. 13

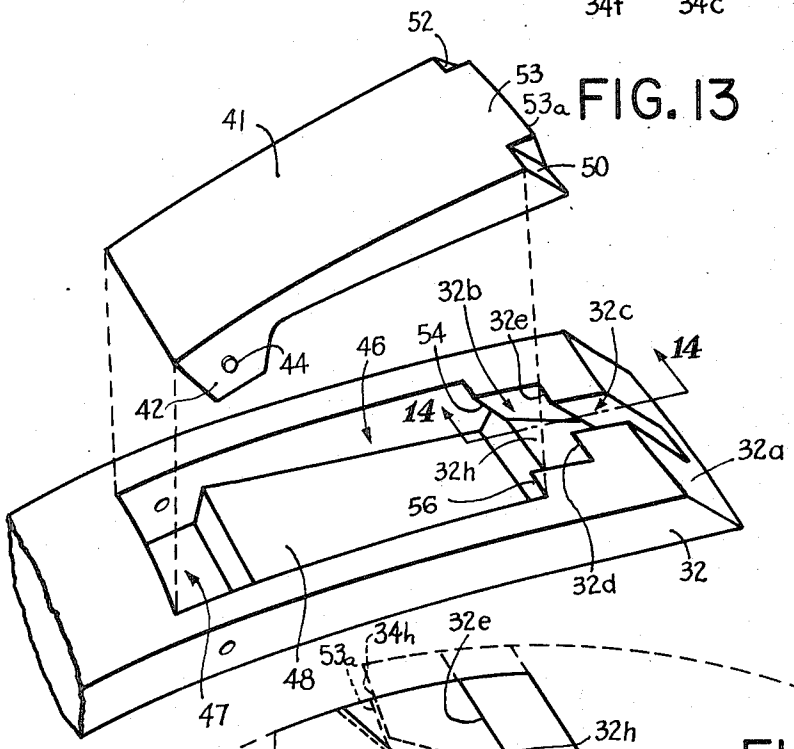
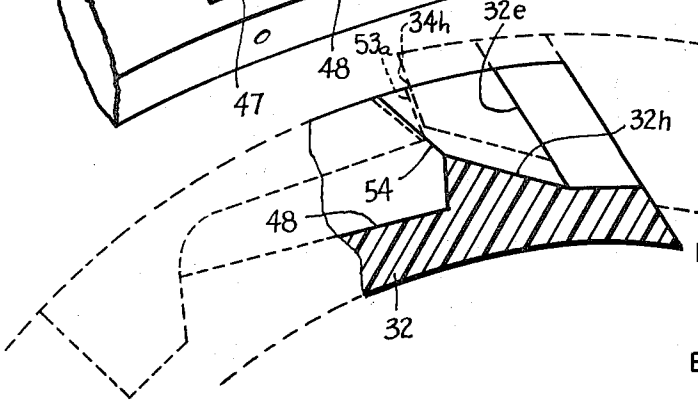


FIG. 14



INVENTOR
JAMES P. O'CONNELL
BY Thomas D. Hamilton
ATTORNEY

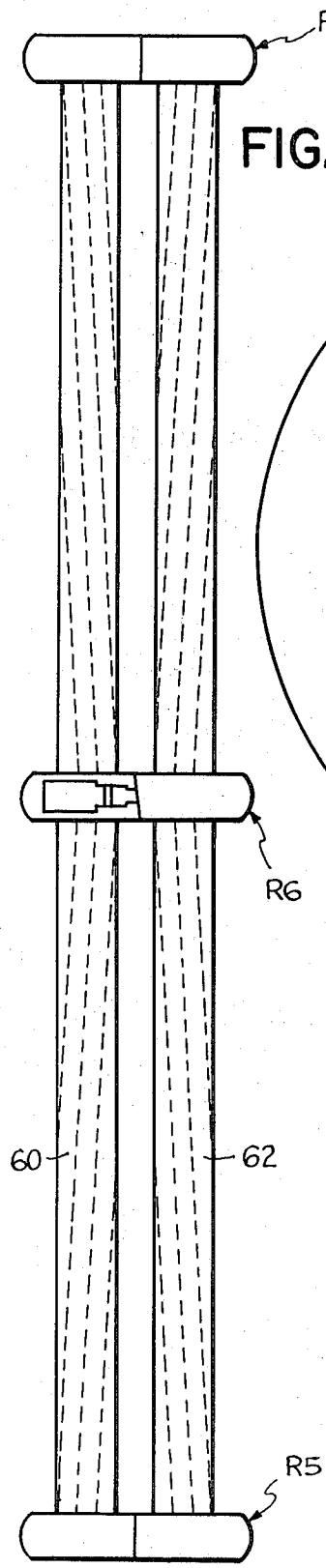


FIG. 20

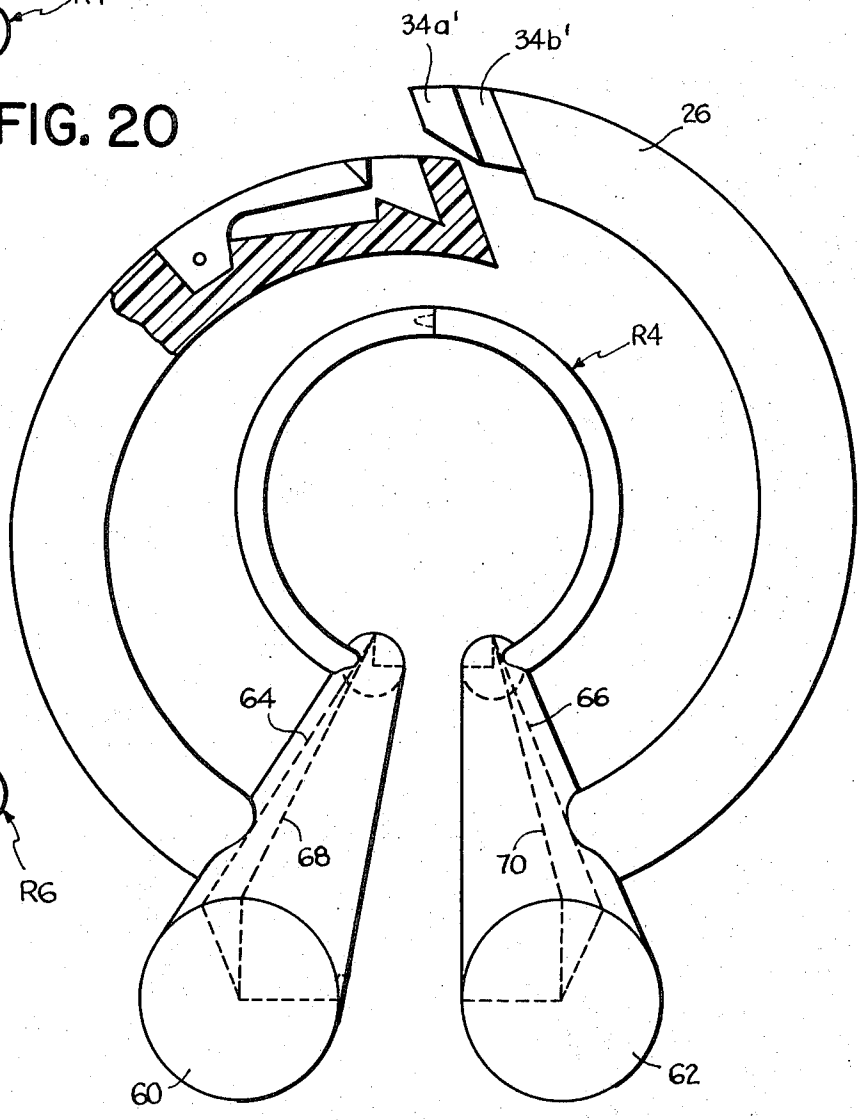


FIG. 19

INVENTOR
JAMES P. O'CONNELL
BY Munn & Hamilton
ATTORNEY

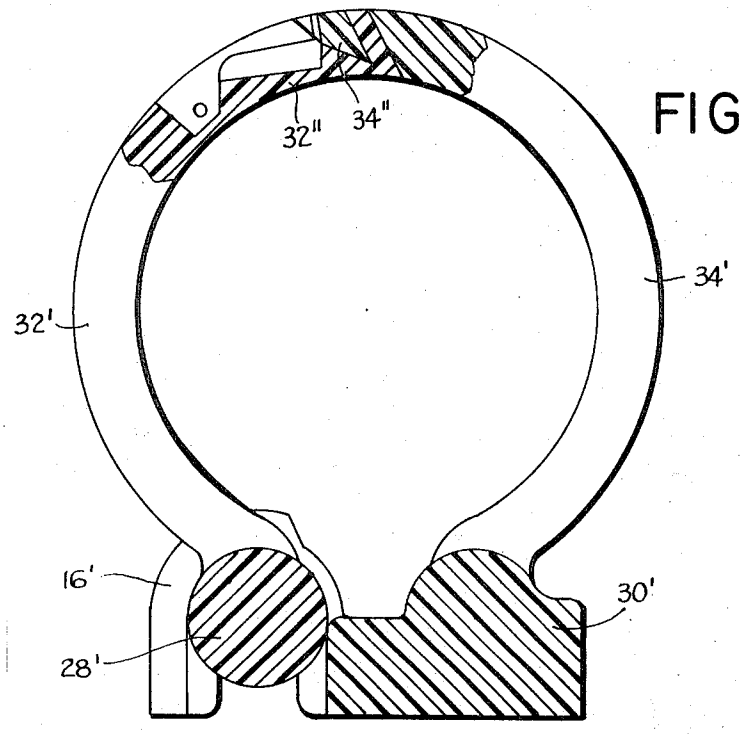


FIG. 22

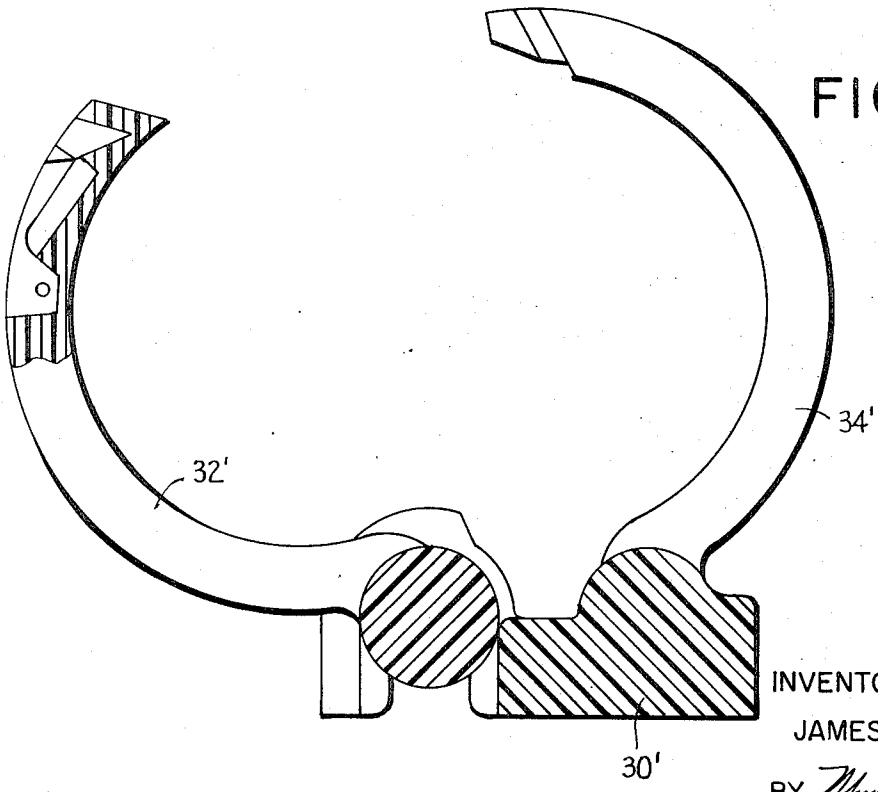


FIG. 23

INVENTOR
JAMES P. O'CONNELL
BY Thomas V. Hamilton
ATTORNEY

FIG. 24

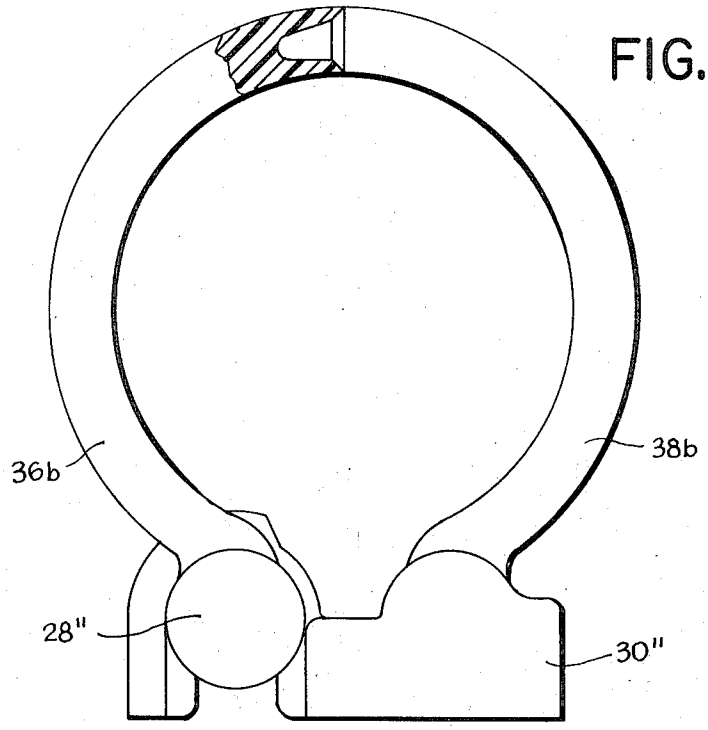
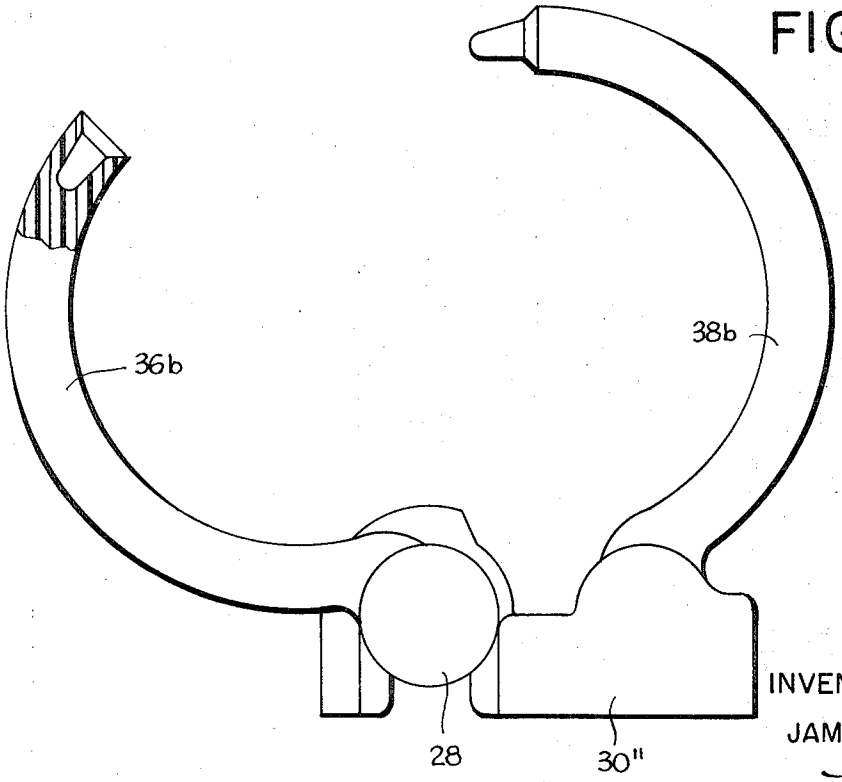


FIG. 25



INVENTOR
JAMES P. O'CONNELL
BY Thomas W. Hamilton
ATTORNEY

FASTENING MEANS FOR DETACHABLY SECURING TOGETHER MATING ENDS OF A BINDER RING CONSTRUCTION AND THE LIKE

The present invention relates in general to fastening devises and in one specific aspect is an improvement in the type of fastening device employed in a binder ring construction for notebook paper as disclosed in U.S. Pat. No. 3,270,749 and issued to me under date of Sept. 6, 1966.

As earlier noted in U.S. Pat. No. 3,270,749, one common form of notebook paper is customarily provided with ring apertures, and a one-quarter inch diameter aperture has for many types of notebooks become standardized. The invention is especially concerned with the notebook paper and binder ring construction in dealing with ring apertures of this size, although the invention is not limited to this particular ring aperture size or arrangement.

The most common form of notebook for receiving and detachably supporting notebook sheets in a satisfactory manner is of the type utilizing ring sections which can be snapped into open and closed positions as desired. With such a ring construction, problems arise in closing the ring sections into smooth jointed relationship while at the same time providing for convenience in operation.

For example, it frequently happens that interlocking binder ring extremities in moving into an engaged position may fail to abut in a correctly matched relationship to one another. Thus, there may result a slight misalignment with projecting edges or surfaces being offset or standing out from the curved under-surface of the respective ring positions. When this occurs, there may develop, during frequent turning over of notebook sheets, a tendency for the ring apertures in the paper sheets to become enlarged roughened and, in some cases, torn through in a highly objectionable manner.

It is, therefore, a chief object of the present invention to deal with problems of the type indicated above and to provide an improved binder ring construction.

Another specific object of the invention is to devise a looseleaf binder ring structure in which interlocking ring sections are formed with uniquely designed ring ends capable in a closed position of providing such a tightly fitted joint that there is presented a smooth contour along the undersurface, the side surfaces and the top surface at the line of juncture whereby the ring apertures in looseleaf notebook paper may slide freely without interference at any point along the line of juncture.

Another object of the invention is to provide cooperating locking ends for a split ring construction and to include therein a special locking insert member which can be selectively operated to disengage the ring sections when desired.

Another object of the invention is to provide locking means which are independently operable and which are engaged silently and smoothly without a spring snap action to avoid possible injury to the fingers and to avoid displacing sheets in the opening process when a large number of sheets are present in the notebook.

Another object of the invention is to devise a combination of binder ring sections, rotatable shafts, and means whereby a single pair of interlocking sections may be employed to control movement of other pairs

of non-interlocking ring sections without requiring manual handling of the non-interlocking sections.

Still another object is provided by a combination of binder ring sections and rotating shaft means to develop torsion forces capable of compressibly securing together non-interlocking ring sections when a pair of interlocking ring sections are closed.

The nature of the invention and its other objects and novel features will be more fully understood and appreciated from the following description of the preferred embodiments of the invention selected for purposes of illustration and shown in the accompanying drawings, in which:

FIG. **1** is a fragmentary perspective view illustrating a notebook with the ring binder means of the invention associated therewith;

FIG. **2** is a plan view of ring binder means of the invention shown in combination with rotatable shafts of the type indicated in FIG. **1** but removed from the notebook structure;

FIG. **3** is an enlarged fragmentary plan view of the central ring binder construction shown in FIGS. **1** and **2**;

FIG. **4** is a cross sectional view taken on the line **4—4** of FIG. **3**;

FIG. **5** is a cross sectional view of binder ring sections and rotatable ring shafts with the interlocking ends of the rings sections being in a fully closed position;

FIG. **6** is a view similar to FIG. **5** but showing the ring sections in separated relationship;

FIG. **7** is a fragmentary diagrammatic view illustrating ring sections held in the fingers of an operator with the interlocking ends in a partly disengaged position;

FIG. **8** is a view similar to FIG. **7** showing a further stage of disengagement of the ring sections;

FIG. **9** is a view of mating ring sections located at the ends of the shaft members shown in FIG. **1**; FIG. **10** is a view similar to FIG. **9** showing the mating ring sections in separated relationship;

FIG. **11** is a fragmentary detail perspective view of a keying section of the ring binder construction of the invention;

FIG. **12** is a fragmentary perspective view of the receiver section of the ring binder construction;

FIG. **13** is another fragmentary perspective view of the receiver section and further showing a locking insert member removed from the receptacle;

FIG. **14** is a detail fragmentary cross sectional view taken approximately on the line **14—14** of FIG. **13**;

FIG. **15** is a cross section taken on the line **15—15** of FIG. **3**;

FIG. **16** is a cross section taken on the line **16—16** of FIG. **3**;

FIG. **17** is a cross section taken on the line **17—17** of FIG. **3**;

FIG. **18** is a cross section taken on the line **18—18** of FIG. **3**;

FIG. **19** is a perspective view of a rotatable shaft assembly indicating ring sections mounted thereon;

FIG. **20** is a plan view of rotatable shaft members and ring sections mounted thereon in a closed position in which torsion forces are exerted to hold outer ring sections in compressed relationship against one another;

FIG. **21** is a detail cross sectional view of a ring section in a ring opening of a sheet material; and

FIGS. **22–25** illustrate modified forms of mating rings.

Referring more in detail to the structure shown in the figures described, there is provided a basic fastening device comprising a pair of mating members movable into interlocking relationship to form a ring body of generally circular shape and a flexing tongue element in one of the mating members for releasably holding the mating members in an interlocking relationship. The mating members when thus held in their interlocking position are characterized by smooth surface contours at inner and outer surfaces as well as along both side surfaces with the result that ring apertures in sheets of material are at all times protected against tearing or other impairment.

It is intended that one or more of these basic fastening devices may if desired be employed in conjunction with any suitable ring supporting means. However, in one preferred bodiment the fastening device of the invention may be employed as a control ring and utilized in combination with other binder ring components which are of the non-interlocking ring type and thus a single opening and closing of the control ring operates to open and close the non-interlocking ring components.

FIG. **1** illustrates one of the basic fastening devices of the invention utilized as a control ring employed in combination with two other binder ring components of the non-interlocking ring type. As shown therein, numerals **2** and **4** denote a loose-leaf enclosure member for detachably holding sheets of material. The front and back cover portions **2** and **4** are secured together by a backing portion **6.**

In accordance with the invention, we may also provide a novel ring supporting structure consisting in an elongated base member **8** which is riveted or otherwise attached to the backing **6** at spaced apart intervals by fastenings as **10.** Formed intergratly with the base member **8** are a number of bearing collars as **12, 14, 16, 18, 20, 22, 24** and **26** in which are rotatably supported a pair of shaft elements **28** and **30.** It should be understood that other well known forms of ring supporting structures may be employed to receive the novel fastening device of the invention.

Mounted centrally of the rotatable shafts **28** and **30** is the control ring of the invention generally denoted by reference character R and at either side of the control ring are two additional ring bodies generally indicated as R1 and R2 each of which are of the non-interlocking type as shown. The ring body R includes mating members **32** and **34** of which mating member **32** is solidly fixed to shaft **28** while mating portion **34** is fixed on shaft **30.** Similarly ring component **36** is fixed to shaft **28** and ring component **38** is fixed to shaft **30** while ring component **40** is fixed to shaft **28** and ring component **42** is fixed to shaft **30.**

Considering in greater detail the construction of the basic control ring R attention is directed to FIGS. **2–8** inclusive and FIGS. **12–14.** As illustrated therein, the mating member **34** is formed with a T-shaped key section and mating member **32** is formed with a receiver section having a T-shaped socket into which the key section may be slidibly engaged.

An important feature of these interlocking sections is the provision therein of two sets of angularly shaped edges occurring in parallel and similarly spaced relationship for slidibly guiding the key section into the key socket in a clinched relationship such that these parts may be firmly held interlocked by a simple tongue element arranged to prevent movement of the keying section out of the keying socket until such time as it is depressed out of its normal blocking position.

The T-shaped key section is indicated on a somewhat enlarged scale in FIG. **11** and as shown therein includes a relatively wide keying end part **34***a* and a relatively narrow web part **34***b*. At either side of the web part **34***b* are angled abutment edges **34***c* and **34***d* and in spaced relation to edges **34***c* and **34***d* and parallel therewith is a second set of angled clinching edges formed on the rear of the keying part **34***a* as indicated by numerals **34***e* and **34***f*. The keying part **34***a* is also relieved at its underside to provide an inclined bottom surface **34***g*.

The receiver section of mating member **32** terminates in an angularly shaped extremity **32***a* whose surface lies in a plan substantially parallel with the plane of the angled edges **34***d* and **34***c* as indicated in FIGS. **11, 12** and **13** and is designed to receive these angled edges in snugly abutting relationship as indicated in FIGS. **2** and **4.** At its upper side the receiver section **32** is formed with a T-shaped socket **32***b* having a web slot **32***c* and along the side adjacent the web slot **32***c* the socket **32***b* is defined by angularly disposed retaining edges **32***d* and **32***e* which are formed parallel with the angularly shaped extremity **32***a*. There is thus provided a second set of angled edges having the same spacing and degree of angularity as the angled edges **34***c*, **34***d*, **34***e*, and **34***f*. The bottom **32***h* of the socket is also inclined to correspond to the inclined bottom surface **34***g* of keying end **34***a*.

By means of the construction described the two mating members may be moved together as shown in FIGS. **7** and **8** in overlapping relationship to position the keying section immediately above the receiver section. The two sets of angularly shaped edges then operate to slidibly engage the parts together with the edges **34***e* and **34***f* becoming clinched over edges **32***d* and **32***e* and with abutment edges **34***c* and **34***d* snugly fitting against the angled extremity **32***a* as shown in FIG. **4** so that smoothly contoured surfaces are provided.

It will be apparent that by grasping the two mating members and pushing them towards one another the keying section is readily slid upwardly to provide for disengaging the parts as indicated in FIG. **7.**

To prevent disengagement of the mating parts, I further provide a special flexing tongue element **41** which includes a base section **42** designed to be anchored in the tongue recess well **47** by means of fastening studs as **43** and **44.** The tongue element **41** is made of a relatively flexible material which provides for flexing movement of the tongue when a thumb pressure is exerted thereon.

It is pointed out that the tongue recess **46** is defined by a bottom surface **48** which is inclined away from a well portion **47** in which the tongue section **42** is anchored, as shown in the drawings. In a normal position of the tongue, it functions to block the keying section from movement out of engagement with the receiver section. When the tongue is in this normal blocking position, there is provided a space between the underside of the tongue and the inclined surface **48** and this space allows the tongue to be flexed downwardly by a simple thumb pressure sufficiently to allow movement of the tongue into a position in which it is no longer blocking the keying section.

An important feature of the flexing tongue is the provision therein of angled stop surfaces **50** and **52** which

are separated from one another by a blocking end **53.** Cooperating with these angled stop surfaces **50** and **52** are also provided a second set of stop surfaces **54** and **56** against which the stop surfaces **50** and **52** engage. The stop surfaces **54** and **56** are formed at the end of the tongue recess **46** at points as most clearly indicated in FIGS. **13** and **16.**

It will be understood that the blocking end **53** projects into the keying section socket a short distance so that this blocking end has its face **53***a* arranged to lie very close to the face **34***h* of keying section **34***a*, and while it does not completely come into contact with the keying section **34***a*, it is sufficiently close so that relatively no displacing movement of the keying end can take place without the blocking tongue having been depressed.

In the preferred arrangement of the control ring construction now described, the two mating sections are designed to be supported on two rotatable shaft members. However, I may desire to mount one of the mating members, for example, the mating member formed with a keying section, in a fixed position on a base member with the mating portion having a receiver section being mounted for rotatable movement on one shaft only. This arrangement is illustrated in FIGS. **22** and **23,** wherein mating portions **32'** and **34'** are formed with respective receiver sections **32''** and keying section **34''**. These keying and receiver sections are similar to those already described above. In FIG. **22** the mating portion **34'** is shown solidly anchored to a base member **30'** while the mating member **32'** is fixed to a shaft **28'** which is rotatably supported in collar portions as **16'**. FIG. **23** shows the same structure with the mating portion **34** in the same fixed position but with the mating portion **32** having been rotated in a counterclockwise direction to provide for opening the ring body.

The non-interlocking type of ring members indicated at R1 and R2 have been further illustrated in FIGS. **9** and **10** and as shown therein, the ring portion **38** is formed with a tapered engaging part **38***a*, adapted to fit into in snugly held relationship a correspondingly shaped recess **36***a*. It will be noted that the particular arrangement of parts provides for a quick and simple fitting together of the two ring sections and, if desired, other engaging shapes may be employed.

The mounting of ring sections on only one rotatable shaft may be resorted to with respect to these non-interlocking types of rings, as shown in FIGS. **24** and **25.** As noted therein, a ring portion **38***b* and a ring portion **36**b are mounted respectively on a fixed base portion **30''** and a rotatable shaft **28''**. FIG. **24** shows the parts in a closed position, and FIG. **25** shows the same parts in separated relationship.

In FIGS. **19** and **20,** I have shown a modification of the binder ring construction in which two rotatable shafts are employed with each shaft supporting a mating portion for rotative movement towards and away from one another. In the modification illustrated in FIGS. **19** and **20,** the position of the control ring portions is different from that of outer ring portions on the shaft, with the result that the outer ring portions may be brought into contact with one another while the control ring portions are still spaced apart an appreciable distance. Upon forcing the control ring portions together, a significant twisting action along each of the shafts is developed and thus the resulting torsion forces act very effectively to compressibly hold the outer ring portions without any interlocking engagement being required.

In FIG. **19,** shafts **60** and **62** support outer ring components R4 and R5 and a control ring R6. As indicated in FIG. **19,** the mating portions of the outer ring R4 are so arranged on their respective shafts **60** and **62** as to provide for a fully engaged position when mating portions of the ring R6 are in separated relationship. This relative difference in positioning is realized by securing the mating portions of ring R6 spaced apart a greater distance around the shaft's peripheries than is the distance of spacing of the ring portions R4 and R5. This relative spacing is indicated diagrammatically by the dotted lines **64** and **66** in FIG. **19,** and the relatively narrower spacing of the ring R4 is indicated diagrammatically by the dotted lines **68** and **70.** FIG. **20** indicates diagrammatically, by the dotted lines appearing therein, the twisting action obtained when the ring R6 is in a fully closed position and the desired torsion force is exerted.

While I have shown and described a preferred embodiment of the invention, it is intended that changes and modifications may be made within the scope of the appended claims.

I claim:

1. Improved fastening means comprising a pair of hinged mating members movable into interlocking relationship to form a ring body, one of said mating members presenting an end portion which terminates in a T-shaped key section having a flat end surface, the other of said mating members consisting in a receiver section including a socket which is complementary with the T-shaped key section and into which the key section is fitted, the head of said T-shaped section being formed by said end portion of said one mating member being recessed along two opposite sides to define a web portion extending between a pair of forwardly located inclined guide edges and a pair of rearwardly located inclined guide edges occurring parallel to the said forwardly located guide edges, said forwardly located inclined guide edges being slidably engageable with correspondingly inclined guide edges formed in the said socket along non-radial paths of travel to move the two sections into detachably interlocked engagement, said receiver section having an inclined surface for supporting an angled bottom surface of the T-shaped key section when the two sections are in a fully interlocked position of engagement, a flexible tongue element positioned in a tongue recess of the receiver section, said tongue recess being further defined by a bottom which is located below the flexible tongue element to provide a passageway, and a pair of spaced tongue retaining edges lying above and at either side of the tongue passageway, said flexible tongue element having one end anchored in a recess well and having its other end free for vertical movement downwardly into the tongue passageway, the free end of the said flexible tongue element terminating in a pair of angularly inclined faces complementary to the said pair of spaced tongue retaining edges in the tongue recess of the receiver section and in a flat blocking surface, and the said inclined faces of the flexible tongue element and the tongue retaining edges of the tongue recess providing mating surfaces to prevent upward displacement of said flexible tongue element from said tongue recess, said blocking surface and said end surface being posi-

tioned to mate with each other when said inclined guide edges of said two sections mate with each other and said mating surfaces and said mating guide edges being in non-parallel planes whereby said T-shaped section is prevented from upward movement out of said recess, said tongue element being so positioned in said recess so as to maintain said blocking surface of said tongue element in close face to face relationship with the flat end surface of the key section and to maintain the pair of angularly inclined faces in mating relationship, thereby preventing accidental disengagement of said mating members until the tongue element is depressed into its underlying passageway.

* * * * *