June 24, 1941. S. J. STEWART 2,246,702

BINDER

Filed Aug. 26, 1938

Fig. 1.

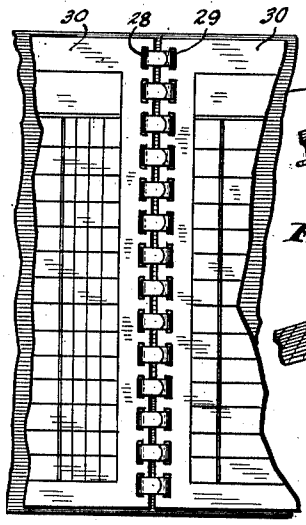


Fig. 2.

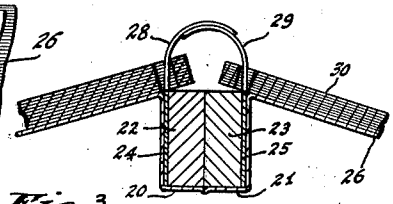


Fig. 4.

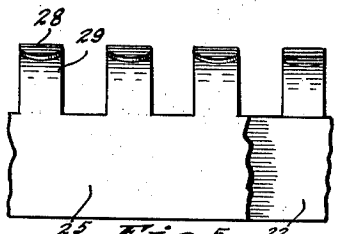


Fig. 3.

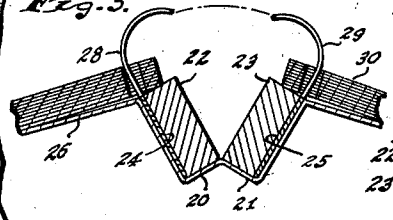


Fig. 5.

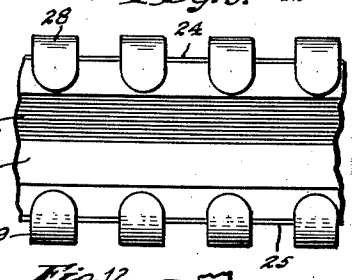


Fig. 13.

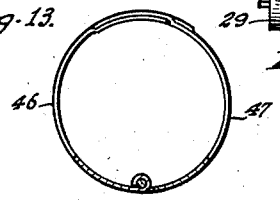


Fig. 12.

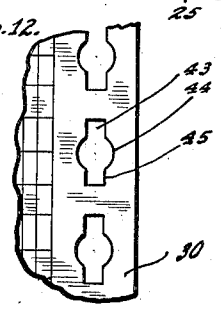


Fig. 6.

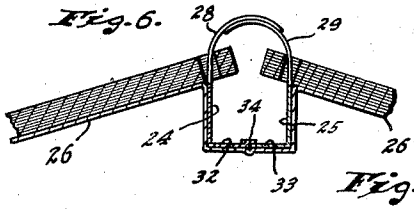


Fig. 14.

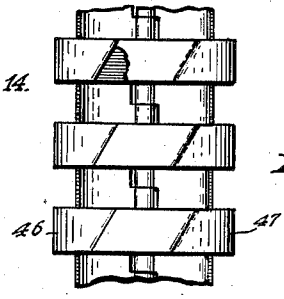


Fig. 7

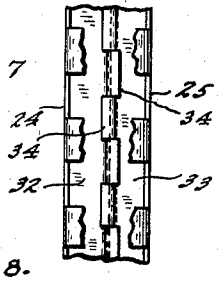


Fig. 10.

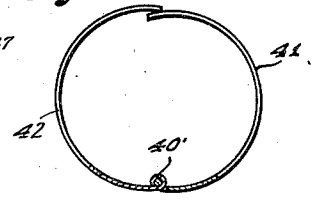


Fig. 8.

Fig. 9.

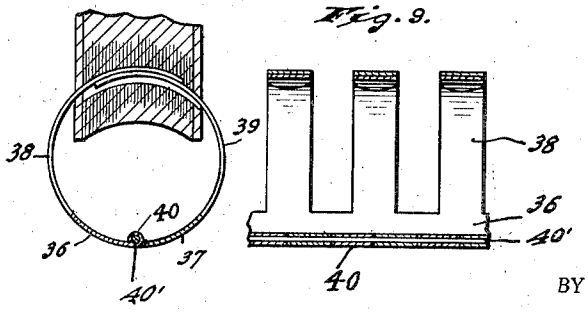
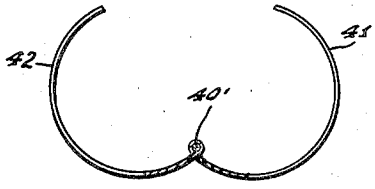


Fig. 11.



INVENTOR.
SEYMOUR J. STEWART,
BY
ATTORNEYS.

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UNITED STATES PATENT OFFICE

2,246,702

BINDER

Seymour J. Stewart, Indianapolis, Ind.

Application August 26, 1938, Serial No. 226,869

13 Claims. (Cl. 129—17)

This invention relates to a device for binding in book form sheets of paper which are provided along one of their edges with a row of closely spaced perforations and which are adapted to be fastened together by a binder which has a series of similarly spaced curved loops or teeth respectively extending through registering perforations of the sheets.

There has recently developed a wide-spread use of such sheets in various book-like products such as magazines, notebooks, advertising pamphlets, and price lists. The binders used are several kinds. One type embodies a helical wire with the turns of the helix forming the sheet-retaining loops; another type embodies a wire bent in the form of a comb, the teeth of which are double-stretches of wire curved through 360° about an axis parallel with interconnecting longitudinally stretches of wire which form the back of the comb; another is of sheet metal in the form of a comb with its teeth bent in the same manner as the wire-comb type, and sometimes with their free ends brought into some fastening relationship with the back of the comb.

This general type of sheets and binders has several advantages. The binders are relatively inexpensive. The pages turn freely and lie flat against each other in any open-book position. By the use of a large number of holes and a large number of binding loops or teeth, the resistance of the paper to separation from the binder is greatly increased—i. e. the number of tears which must occur in the paper if a sheet is to be torn out is greatly multiplied—and in consequence it is permissible to locate the holes in a sheet close to the edge of such sheet, and hence to use binding loops of smaller diameter with respect to the aggregate thickness of the sheets which are received in that binder.

But this general type of binder also has disadvantages, and it is my object to overcome these disadvantages while still retaining the benefits of the advantageous features. The loops of such binders are generally exposed at the outside of the book so that it is impossible to print anything on the back edge of the book. Such binders are flexible and hence give no support to the book, which will not stand upright except when very heavy cover sheets are used. But most serious is the necessity for a considerable quantity of special equipment for applying such binders, so that none except a very large printer can afford to have the necessary equipment for the variety of sizes and types of binders which he may be called upon to use.

It is my object to provide an inexpensive, simple binder which will have the aforementioned advantages but will require substantially no special equipment to apply and may be applied easily by hand after suitably punching the sheets. It is a further object of my invention to provide a binder which will embody the advantages of this general type, and will have a rigid backbone on which any desired printing may be applied, and in which the mechanism may be concealed by a cover and may be made in a wide variety of sizes and of various materials. Another object of my invention is to provide a binder of this type in which the sheets may be readily interchanged, to permit the addition, removal, or replacement of sheets, as for instance in price books or advertising literature.

According to my invention I form the binding mechanism in two comb-shaped parts, conveniently of sheet metal or of a synthetic resin, which are hinged together at the comb-backs on an axis disposed at the center of the back edge of the binder and extending longitudinally thereof; and I curve the teeth of the respective combs toward each other into lapping relationship and about an axis disposed between the lapped tooth-stretches and the hinge axis. The lapped tooth-stretches extend for a considerable arc of the curve on which they are bent, so that ends of the lapping stretches will be closer to the hinge axis than the intermediate portion of those lapping stretches, and will therefore tend to hold the two parts interlocked in closed position. By reason of the relatively large number of overlapping teeth this interlocking action may be made effective with relatively simple materials and without imposing much load upon any of the individual teeth. Separation of the two sets of teeth may be accomplished by hinge-opening movement of the parts, which will cause the respective teeth to spring radially of their curvature to permit the ends of the overlapping teeth to ride over the higher intermediate portions of the underlapping teeth.

The amount of interlocking or the resistance to hinge-opening will vary with the amount of lapping of the teeth, the stiffness of the teeth, the number of teeth, and the ratio of the radius of the hinging movement to the radius of curvature of the lapping portions of the teeth.

The accompanying drawing illustrates my invention. In such drawing Fig. 1 is a plan of a binder in open-book position; Fig. 2 is a transverse section of the binder of Fig. 1, on a somewhat enlarged scale; Fig. 3 is similar to Fig. 2

except that the binder is shown in open-hinge position; Fig. 4 is a fragmental side elevation of a binding mechanism, separate from other parts of the binder; Fig. 5 is a plan of mechanism shown in Fig. 4, in open-hinge position; Figs. 6 and 7 are respectively a transverse section and a plan of a binder with a modified form of hinge and without the filler-blocks shown in Figs. 1 to 3; Figs. 8 to 11 inclusive show another example of a binder embodying my invention, Fig. 8 being a transverse section, Fig. 9 a longitudinal section, and Figs. 10 and 11 transverse sections of the binder mechanism respectively in partially closed and fully opened position, Fig. 10 showing the closing action of a binder in which the teeth of one set are longer than those of the other; Fig. 12 is a fragmental plan of a sheet of paper for use in a binder such as those shown in Figs. 1 to 11, showing a modified form of perforation; Figs. 13 and 14 are respectively a transverse section and a plan of a binder having a modified form of interlock between its teeth.

The binder of Figs. 1 to 5 has two rigid frame members 20 and 21, formed of filler blocks 22 and 23 and overlying comb-shaped members 24 and 25 respectively secured to the outer faces of the filler blocks. The two frame members are hinged together at their back edges by means of the material of a cover 26 which is secured to the back edges and to the outer faces of such members. The teeth 28 of the comb-shaped member 24 are arranged in a longitudinally extending, closely spaced series, and the teeth 29 of the comb-shaped member 25 are similarly arranged, with the teeth 29 respectively alined with the teeth 28. Such teeth 28 and 29 extend laterally from similar edges of the outer faces of the members 20 and 21 in the planes of such faces and thence inwardly toward each other and into lapping relationship, in a curve about an axis disposed in the plane of the inner faces of the filler blocks and at a considerable distance from the hinge-axis. The lapping stretches of the teeth extend for approximately a quarter of the circle on which the teeth are bent.

The lapping stretches of the teeth 28 and 29 are closer to the hinge axis at their ends than at their midportions, and hence interlock to hold the two members 20 and 21 together. The straight stretches of the teeth 28 and 29, immediately adjacent the filler blocks, provide ample room for the sheets of paper 30 when the binder is in open-book position, even though the aggregate thickness of such sheets causes them to be held tightly when the book is closed and they are received by the curved portions of the teeth. It may be noted that the ends of the teeth are rounded, to facilitate movement of the sheets past such ends.

In making up a book with a binder of this type, a suitable cover 26 is applied to the frame members 20 and 21, as by gluing such cover to the back and outside faces of those frame members. Then, with the binder in open-hinge position the sheets of paper 30 are placed on the teeth 28 and 29, and the two frame members are brought to closed-hinge position. In this movement, the end of one tooth of each alined pair rides over the outer surface of the other tooth of that pair, the teeth being sprung radially to permit such over-riding and springing back toward their normal position as the closed-hinge position is finally reached. The two frame members 20 and 21 may be identical, with the teeth 28 and 29 curved on the same radius. In this case, when the teeth are in overlapping position they will be slightly sprung out of their normal position, and this slight stress will urge them tightly together, particularly at the ends of the lapping stretches.

In the binder of Figs. 6 and 7 the comb members 24 and 25 are provided at their rear edges with inwardly extending flanges 32 and 33, whose meeting edges respectively carry series-groups of offset tongues 34, such tongues being offset in a direction toward the teeth 28 and 29 a distance equal to the thickness of such flanges. Desirably, each tongue extends in width from a tooth center-line to a tooth-space center-line, preferably to the center line of the immediately adjacent tooth-space. By thus disposing the edges of the tongues at such center-lines, regularly spacing the tongues, and making them the same width as the spaces between them, the two comb members 24 and 25 with their attached flanges 32 and 33 and their teeth 28 and 29 can be made identical, and will fit together with their tongues interfitting and their respective teeth in proper alinement.

The simple hinge formed by the offset tongues 34 will keep the flanges 32 and 33 in alinement and will hold the combs 24 and 25 in proper spaced relationship, and needs only to be bound together as by means of the cover material 26 which may be glued to the outer surfaces of the comb-backs and of the flanges.

In the binder of Figs. 8 and 9 each of the two parts 36 and 37 has a longitudinally extending comb-back portion with teeth 38 and 39 extending from one of its longitudinal edges and with spaced hinge-loops 40 on its other longitudinal edge. The hinge-loops 40 are desirably spaced in the same way that the tongues 34 are spaced in Figs. 6 and 7, so that the two parts may be identical. The two parts 36 and 37 of this binder are bent about a common axis, so that the hinge pin 40' through the hinge loops 40 lies at or near the circumference of the circle on which such parts are bent, and the lapping stretches of the teeth 38 and 39 lie diametrically opposite. Here again, the center of curvature of the teeth lies closer to the lapping stretches than to the hinge axis. In this binder of Figs. 8 to 11, the cover pages may be punched in the same manner as the sheets and applied to the binder by placing them on the teeth, instead of gluing a cover to the outer surfaces of the binder mechanism. The rigid backs of the binder parts will still serve to receive any desired printing.

In all of the binders described hereinbefore, the two teeth of each alined pair were considered to be of equal length, in which case their ends would theoretically abut at an early point of the hinge-closing movement of the binder. I have found that usually no special provision is necessary to assure that one tooth of each pair will slide over the other one, and in most cases I deem it immaterial whether all the teeth of one set overlap their respectively opposite teeth of the other set or whether some of the teeth of one set overlap and others underlap their respectively opposite teeth. Where, however, it is desired to have all the teeth of one set underlap their respectively opposite teeth and to positively avoid any chance of abutting between the teeth, the arrangement may be used which is shown in Figs. 10 and 11, in which the teeth 41 are somewhat longer than the teeth 42, so that they extend a greater distance beyond a point

diametrically opposite the hinge axis and thus lie closer to such hinge axis than do the ends of the shorter teeth 42, and their ends will always underlie the ends of such shorter teeth.

To facilitate movement of the sheets of paper 30 past the rounded ends of the teeth such as those shown in Figs. 1 to 11, I may punch the sheets of paper to provide openings of the shape shown in Fig. 12. The main body of each of such openings is rectangular and of a size to loosely fit the double thickness of the lapped tooth stretches, but the long edges of the openings are provided with shallow curved notches 44. Such notches 44 are shorter than the long edges of the notches 43, to leave portions 45 of those long edges intact. When sheets which are so perforated are moved from a single thickness tooth portion to a double thickness tooth portion the rounded end of the lapping tooth will first enter a notch 44 and the edges of such notch will ride over the edges of such rounded tooth-end to carry the sheet on to the double thickness portion.

Instead of so perforating the sheets for this purpose, I may offset the lapping portions of the teeth, as in the manner shown in Figs. 13 and 14. Here each tooth 46 is offset inwardly over that portion of it which is intended to underlap its opposite tooth 47, and the tooth 47 is offset outwardly over that portion which is intended to overlap the tooth 46. The offsets start and the teeth end on diagonal lines, so that it is impossible for the edge of a sheet perforation to enter the slight notch at the end of a tooth.

As has been pointed out, my binder provides a stiff back which may receive any desired printing and which supports the book so that it can be readily placed upright on a shelf. By using a multiplicity of teeth I am enabled by simply overlapping the ends of the teeth to securely interlock the binder in closed position; and to bind sheets together which are perforated near their edge so that a relatively thick stack of them may be bound in a relatively thin binder. Since binders embodying my invention may be utilized by simply inserting appropriately punched sheets, and by gluing any desired cover in place, they may be applied by any printer, without special equipment save possibly for a punch of suitable shape for the punching machine which is part of his regular equipment.

I claim as my invention:

1. A binder, comprising a pair of frame-members hinged together at a longitudinal edge, a longitudinally-extending closely-spaced series of laterally extending teeth on each of said frame-members, the teeth of one of said series being respectively alined with the teeth of the other of said series, said teeth of said two series being bent toward each other about a common axis disposed inwardly from said hinge axis and in the central longitudinal plane of said binder, the respective teeth of one series overlapping the teeth of the other series for a considerable arc about said common axis, said teeth being resilient so that the combined locking effects of the several lapping pairs of teeth holds the binder closed.

2. A binder, comprising a pair of frame-members hinged together at a longitudinal edge, a longitudinally-extending closely-spaced series of laterally extending teeth on each of said frame members, the teeth of one of said series being respectively alined with the teeth of the other of said series, the teeth of each alined pair being bent toward each other and into lapping relationship, the lapping stretches thereof being smoothly curved about an axis spaced inwardly from said hinge axis, said teeth being resilient so that the combined locking effects of the several lapping pairs of teeth holds the binder closed.

3. A binder, comprising a pair of frame-members hinged together at a longitudinal edge, a longitudinally-extending closely-spaced series of laterally extending teeth on each of said frame-members, the teeth of one of said series being respectively alined with the teeth of the other of said series, the teeth of each alined pair being bent toward each other and into lapping relationship, the lapping stretches thereof being closer at their ends to said hinge axis than at their intermediate portions, said teeth being resilient so that the combined locking effects of the several lapping pairs of teeth holds the binder closed.

4. A binder, comprising a pair of longitudinally extending frame members, cover means secured to the outer surfaces of said frame members, a longitudinal series of resilient teeth on each of said frame-members within said cover means, said two series of teeth being spaced at their base lines, said frame members being hinged together on a line spaced from said base lines in a direction away from said teeth, and said respective series of teeth being bent into lapping relationship with each other on a radius shorter than the distance from their lapping stretches to said hinge axis, whereby the binder is effectively held closed by the combined resistances against separation of the several individual lapping pairs of teeth.

5. A binder, comprising a pair of frame-members, a closely-spaced series of resilient teeth carried at one-longitudinal edge of each of said members and an inwardly extending flange carried at the other edge thereof, hinge means interconnecting the free edges of said flanges, the teeth of said respective two members being bent inwardly into position to substantially interlap when said members are in closed-hinge position, the radius of curvature of said lapping portions being shorter than the distance from said lapping portions to said hinge axis, whereby the binder is effectively held closed by the combined resistances against separation of the several individual lapping pairs of teeth.

6. A binder, comprising a pair of identical frame-members, each frame-member having a regular series of spaced resilient teeth at one longitudinal edge and a regular series of hinge elements at the other longitudinal edge, the center lines of the teeth being equally spaced from the center lines of the tooth-spaces and each of said hinge-elements extending from one to another of said center lines, whereby the interfitting of the hinge elements on said two frame-members brings the teeth thereon into alinement, said teeth being bent into substantially inter-lapping relationship with the lapped portions curved on a radius shorter than the distance from such portions to said hinge axis, whereby the binder is effectively held closed by the combined resistances against separation of the several individual lapping pairs of teeth.

7. A binder, comprising a pair of identical frame-members, each frame-member having a regular series of spaced resilient teeth at one longitudinal edge and a series of hinge elements at the other longitudinal edge, the inter-fitting of the hinge elements on said two frame-mem-

bers being adapted to bring the teeth thereon into alinement, said teeth being bent into substantially inter-lapping relationship with the lapped portions curved on a radius shorter than the distance from such portions to said hinge axis, whereby the binder is effectively held closed by the combined resistances against separation of the several individual lapping pairs of teeth.

8. A binder, comprising a pair of frame members, said frame members being longitudinally rigid and having a closely spaced series of resilient teeth extending from an edge of each, hinge means interconnecting said members at edges thereof opposite said teeth-carrying edges, said teeth being bent into interlapping relationship with the lapped portions bent on a radius shorter than the distance therefrom to said hinge-axis to create in each of the several individual interlapping pairs of teeth a resistance to separation the combined result of which effectively holds the binder closed.

9. A binder, comprising a pair of comb-shaped members hinged back-to-back and bent into generally cylindrical shape with the hinge-axis extending longitudinally of such cylinder substantially at the surface thereof, the teeth of said comb-shaped members being resilient and extending circumferentially of such cylinder into substantial inter-lapping relationship at a position substantially diametrically opposite said hinge axis, said teeth being sufficiently resilient to cause in the several individual interlapping pairs of teeth a resistance to separation the combined result of which effectively holds the binder closed.

10. A binder, comprising a pair of comb-shaped members, hinge-means interconnecting the backs of said comb-shaped members, the teeth thereof being bent into interlapping relationship and in a curve about an axis disposed between said lapped stretches and said hinge axis, said teeth being sufficiently resilient to cause in the several individual interlapping pairs of teeth a resistance to separation the combined result of which effectively holds the binder closed.

11. A binder as defined in claim 10 with the addition that the several teeth are initially given the same curvature, and the teeth on one of said members extend a greater distance than the teeth of the other of said members past the point diametrically opposite said hinge axis.

12. A binder as defined in claim 10, with the addition that the end-edges of the teeth are disposed at an acute angle to the center-lines thereof and that the underlapping teeth are offset inwardly and the overlapping teeth are offset outwardly over the area of lapping.

13. A binder, comprising sheet-holding teeth extending from opposite directions into lapping relationship, said teeth being of generally rectangular cross-section with considerably greater width than thickness and having rounded ends, a sheet having perforations receiving said teeth, said perforations having rectangular end portions of a width to loosely fit the double-thickness lapped portions of the teeth and having curved notches in the center portions of their long-sides, said notches being adapted to receive the tips of the rounded tooth-ends, to facilitate passage of said sheet from a single-thickness tooth portion to a double-thickness tooth portion.

SEYMOUR J. STEWART.