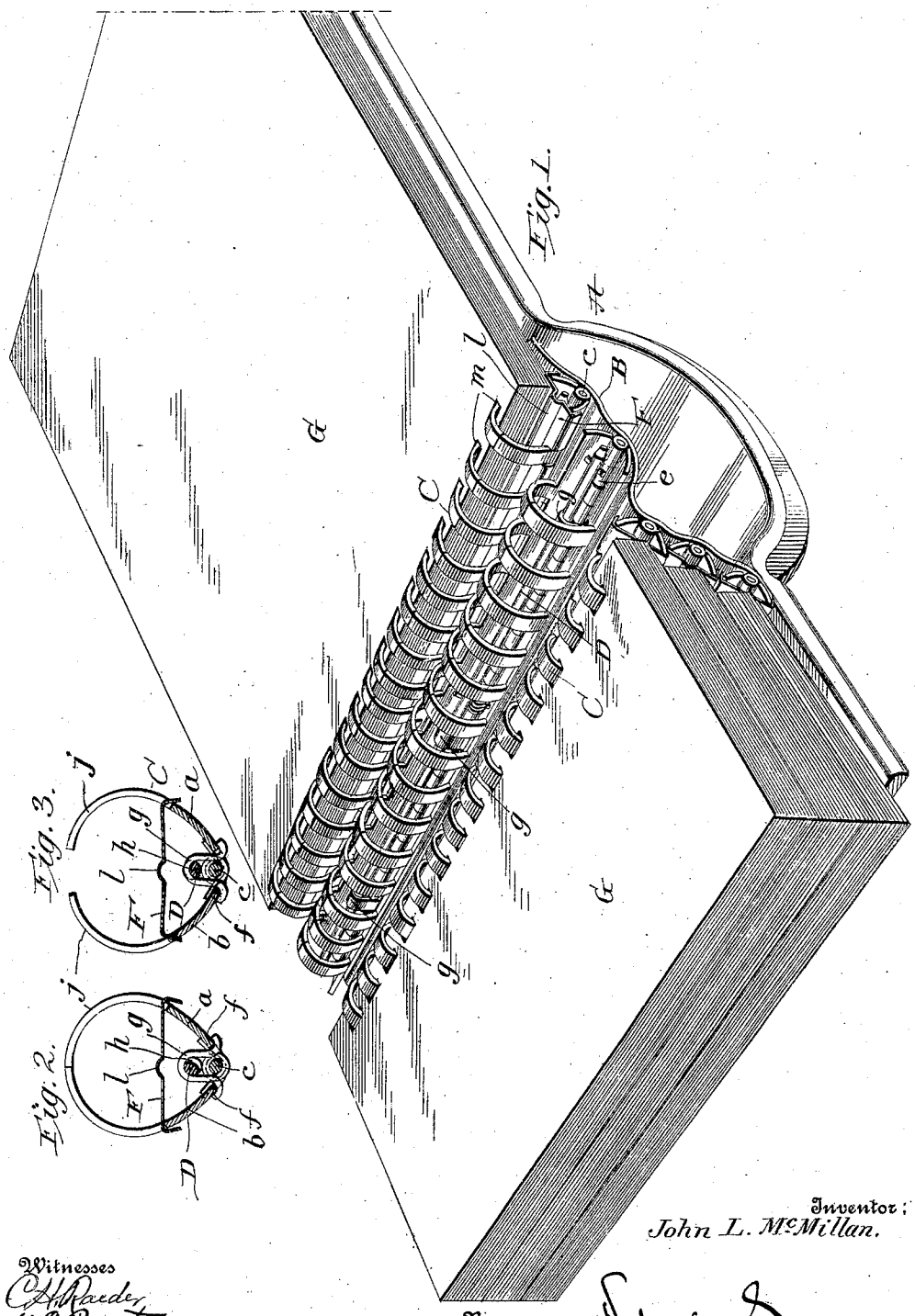
J. L. McMILLAN.

LOOSE LEAF BINDER.

APPLICATION FILED MAY 25, 1908.

986,735. **Patented Mar. 14, 1911.**

2 SHEETS—SHEET 1.



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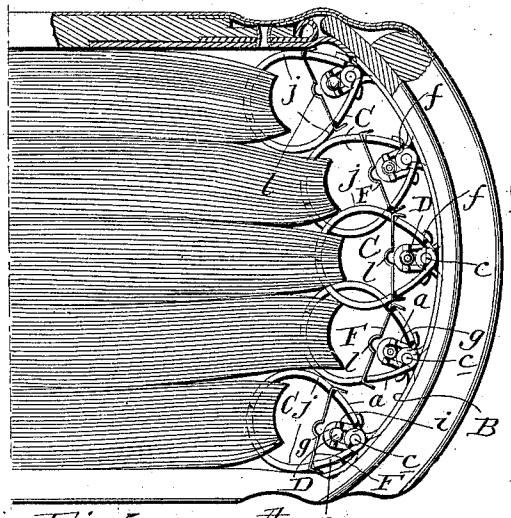

Fig. 5.

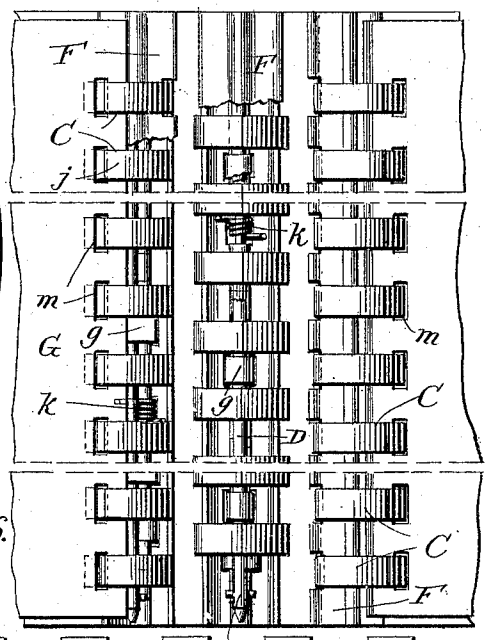

Fig. 6.

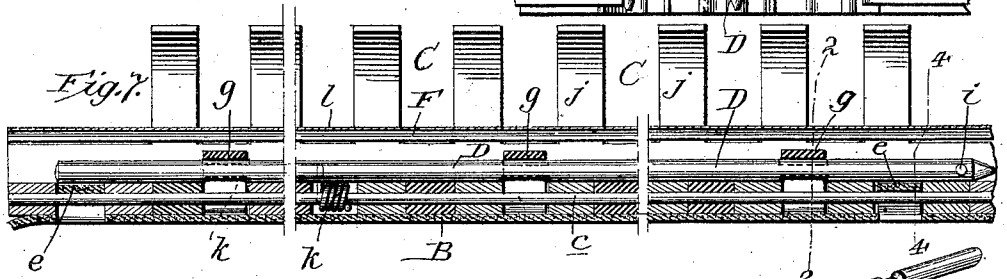

Fig. 7.

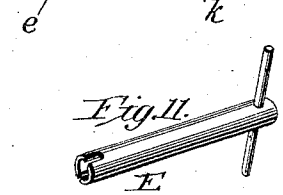

Fig. 11.

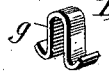

Fig. 9.

Fig. 8.

Fig. 10.

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN L. McMILLAN, OF SYRACUSE, NEW YORK.

LOOSE-LEAF BINDER.

986,735. Specification of Letters Patent. Patented Mar. 14, 1911.

Application filed May 25, 1908. Serial No. 434,844.

To all whom it may concern:

Be it known that I, JOHN L. McMILLAN, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Loose-Leaf Binders, of which the following is a specification.

My invention relates to "loose leaf binders," and has for its object the production of a binder of that class, capable of holding an adequate number of leaves, and permitting all the leaves to lie flat when the binder or the book is opened, as may be done with certain permanently bound books. This end I attain by employing in one cover a plurality of leaf-holding devices, or sets of such devices, preferably of the ring type, each holder or set of holding devices being adapted to permit its contained leaves to move freely to the desired position, and the several holders, or sets of holders, being carried by a flexible support within the cover, which permits each holder with its group or bundle of leaves to rise to proper level to fold over and lie upon the other groups or bundles.

The invention further consists in various other features and details, hereinafter set forth.

The invention is illustrated in one embodiment in the accompanying drawings, but any known and suitable type of holding devices capable of accomplishing the objects herein set forth, may be employed, and it is, therefore, to be understood that the form here shown is merely illustrative, and though well suited to the purpose, may be replaced by other forms.

Figure 1 is a perspective view of a binder made in accordance with my invention, the cover being opened and the leaves cut away to bring the figure within prescribed limits, and one holder being shown without leaves; Figs. 2, 3, and 4 are transverse sectional views of the leaf-holders proper, taken respectively on the lines 2—2 and 4—4 of Fig. 7; Fig. 5 an end view of the binder with portions broken away to show details of construction; Fig. 6 a face view of three of the holders and their flexible supporting sheet or strip, with sections removed to shorten the figure; Fig. 7 a longitudinal section through one of the holders with sections similarly removed for a like reason; Figs. 8, 9 and 10 perspective views, respectively, of the eccentric rod, one of the yokes or stirrups, and the cover plate of one of the leaf-holders; Fig. 11 a perspective view of a key for turning the eccentric rod by which the leaf-holder is opened, or unlocked, and closed.

Loose leaf ledgers have come into very extensive use, but as commonly constructed they cannot be opened out flat, as can the better class of permanently bound ledgers, and this fact impairs their usefulness, and retards their general adoption. To overcome this objection is the primary object of the present invention, which will now be explained in detail, reference being made to the drawings.

A indicates a cover comprising cover boards and back, united by the usual "hinge" or flexible joint, as in any ordinary binding. Within this cover, and attached at its edges to the cover boards, is a sheet B of leather or other flexible material of suitable strength, and of a width to enable it to lie in contact with the inner face of the binder back when the cover is closed, as in Fig. 5. The material and design of the cover proper, that is, the cover boards and back, may vary as desired, the usual ledger binding being here represented.

Secured in any suitable way to the flexible sheet B is a plurality of leaf-holders C, of substantially ring form. In the drawings I have represented, and in practice I prefer to employ, holders comprising two substantially semi-circular plates *a* and *b*, carried by a common hinge rod *c*, which latter is secured in any convenient manner to the flexible sheet B, the plates being formed with fingers *j* upon which the sheets are carried. In the drawings I have shown the rod *c* threaded through loops *e*, formed by cutting slits in the flexible sheet B, and raising up the portion between said slits, as in Figs. 4, 5 and 7, and this I find at once an economical and a satisfactory construction, but obviously other modes of attachment may be substituted.

It will be seen that, as shown in Figs. 4 and 7, the hinge barrels connecting the plates *a*, *b*, are discontinued or cut away at those points where the loops *e* of flexible sheet B are formed, so that said loops may be carried above the hinge rod. The same may be done where the stirrups *g* are located, and ordinarily it is preferred so to do, though this is not essential.

At suitable intervals in the length of the plates *a*, *b*, they are cut away at the edge nearest the hinge rod *c* to form notches or seats *f* for stirrups *g*, which are shown in Figs. 2, 3, 5, 7 and 9. These stirrups straddle the hinge rod, and their upturned ends engage the inner edges of the plates *a*, *b*, or of the notches *f* formed therein. They also straddle a second rod D, which they hold in position in line with the hinge rod *c*, but separated therefrom by the loops *e*, of the flexible sheet B, as best seen in Fig. 4.

The rod D is cut away at those points falling within the loops *g* to form eccentric cylindrical portions *h*, as shown in Figs. 2, 3 and 8, and the rod is furnished with a cross pin *i*, or is otherwise adapted to receive, and to be turned by, a key E, Fig. 11. When the rod so constructed is turned to bring the eccentric portions *h* to the lower side, speaking with reference to the position of the parts when the book lies open upon a table or support, the stirrups *g* will be permitted to drop or to move downward, and toward the hinge rod *c*.

The upturned ends of the stirrups, which normally bear against the edges or end walls of the notches *f*, will thus permit said edges to drop, and cause the fingers *j* of the plates *a*, *b*, to separate, or in other words to move, from the closed position shown in Fig. 2 to the open position illustrated in Fig. 3.

As the hinge rod *c* is not always vertically beneath the rod D even when the book is in use and open, and as it is desirable under all circumstances to ensure a free and prompt separation of the fingers *j* when released, or unlocked, springs *k* are provided preferably consisting of a suitable length of spring wire coiled about the hinge rod *c* with its ends bearing upon the inner or proximate faces of the plates *a*, *b*, as shown in Figs. 1, 2, 3, 6 and 7.

As soon as the rod D is turned to the position indicated in Fig. 3, the springs *k* will throw open the holders C, and permit the insertion or removal of leaves into or from such holder. When the rod is turned to the position indicated in Fig. 2, with the eccentric portions *h* pressed up into the loop or yoke of the stirrup *g*, the fingers *j* of the plates *a*, *b*, will be caused to meet at their free or outer ends, and thus to form a complete ring or loop thus retaining any sheets which may be threaded or impaled upon said fingers. In this position the rod D effectually locks the divided rings in closed or engaging relation, since the stirrups *g* are precluded from falling.

It is thought that the foregoing description should make clear the construction and operation of the divided rings, but to make the matter perfectly clear, it may be restated as follows: Plates *a* and *b* are joined at their lower edges by a hinge rod *c* passing through eyes or barrels at said edges. A second rod D rests directly upon the barrels or eyes through which the hinge rod passes, and is thus maintained at a given distance therefrom. This rod D is cut away at intervals to leave cylindrical portions *h* of smaller diameter than the body of the rod, and eccentric to the axis of the rod. Overhanging these eccentric portions *h* are stirrups or yokes *g* of the form shown in Fig. 9, that is to say, of inverted U form, but with the ends of the depending legs curled upwardly and outwardly. The loop at the top of the stirrup takes a bearing upon the eccentric *h*, while the upturned ends engage beneath the edges of openings cut in the plates *a*, *b*, at either side of, and at some slight distance from, the hinge rod and barrels. The length of the stirrups is such that when the rod D is turned to lower the eccentric portions *h*, or carry the same toward the hinge rod, the stirrups drop down, and consequently permit the plates *a*, *b*, whose edges the stirrups support, to fall apart. Conversely, when the rod D is turned to elevate the eccentric portions *h*, or to carry them away from the hinge rod *c*, said eccentrics pressing upward against the upper loop of the stirrups, elevate the same, and, causing their hooked or curved lower ends to bear against and press upward upon the edges of the openings in the plates *a*, *b*, move said plates upward, and throw the ends of the hooks together or into contact. When the eccentrics *h* are turned so that their axis is in a plane passing through the axes of rods D and *c*, the stirrups are locked or held against falling, and the parts are thus securely held in position with the fingers of the rings tightly closed.

To protect the mechanism thus described, and better prevent the sheets from dropping too far into the holders, I prefer to employ for each holder a cover plate F of thin sheet metal possessing a considerable degree of resilience, notched at its edges to receive the fingers *j* of the sheet holder, and having the fingers formed by such notching bent downward past the sides of the plates *a*, *b*, as indicated in Figs. 2 and 3. To increase the capacity of spreading of said plate, and to permit adequate opening of the plates *a*, *b*, I prefer to make one or more corrugations, *l*, longitudinally of the cover plate F, as shown in Figs. 1, 2, 3, 4 and 6. This, together with the springing of the downwardly turned fingers of the plate, gives a quite elastic action thereto, permitting the plate to yield sufficiently to allow the proper separation of the fingers *j*, yet causing the plate F to maintain its position, and its downwardly turned fingers to engage the plates *a*, *b*, both when said plates are drawn together, and when they are separated.

In order to reduce to a minimum the

space occupied by the several holders C, the fingers *j* of successive or proximate holders are alternated, those of one holder falling midway between those of the next as plainly illustrated in Figs. 1 and 6. By this provision the several holders are enabled to inter-engage, or enter one into another, as well illustrated in Fig. 5, thereby materially reducing the space occupied by said holders when the book is closed, and permitting the several groups of leaves to lie in close contact throughout substantially their entire area.

G indicates the leaves which are perforated near their inner edges, as shown in Figs. 1, 5 and 6. The form of the perforation may vary, but I prefer a narrow slit or opening *m*, extending in the direction of the rods *c*, D; that is to say, from top to bottom of the sheet, and these perforations I locate as close to the inner or rear edge of the sheets as is consistent with proper strength. In practice it is found that this may be quite close. Without in any manner restricting myself to specific measurements, I would say that a measurement of one-quarter of an inch in the direction from top to bottom of the sheet, and one-eighth of an inch at right angles thereto is found a convenient and satisfactory proportion for the perforation, and a measurement of three-sixteenths of an inch from the inner edge of the sheet to the inner side of the perforation is also suitable, but these matters may vary within any reasonable limits, according to the nature of the paper, the size and character of the book, the uses to which it is to be put, etc. They are suggestive merely.

Under the construction above set forth each holder is independent of every other holder, and consequently a leaf, or leaves, may be inserted into or removed from any group without disturbing those of another group. Since by dividing up the total number of leaves into a series of groups each group is made relatively small, it is manifest that the insertion and removal of leaves is rendered much less difficult, and there is far less danger of unintentionally displacing a group of leaves, than where a single holder of size sufficient to contain all the leaves is employed.

By the use of the flexible sheet B capable of dropping into, or lifting out of, the back or middle portion of the cover A, the several groups of leaves are enabled to drop into place when the cover is closed, and thus to give to their outer or front edges substantially the curve which they have in a permanently bound book, and by reason of the same feature,—the employment of the flexible sheet,—the several holders are enabled to lift out of the curved back or middle section of the cover to whatever plane is necessary to enable their holders to fold over and lie flat upon those of other holders, as plainly illustrated in Fig. 1, in which figure the first three holders are represented as filled with leaves, the fourth is shown empty, and with the cover plate F removed, and the fifth is shown supplied with leaves.

As above indicated the specific construction of the holder herein set forth, while deemed and found eminently suitable to the primary object of the invention, is not essential to the attainment of that object, and any of the well-known ring forms of holder may be substituted for that shown without departing from the spirit and scope of my invention. On the other hand, a ring form of holder is essential to the attainment of the full benefits of my invention, since such form alone permits the leaves to move laterally when a particular section is lifted from the back to a point above the other sections, and to lie flat upon the leaves of such other sections or holders.

I am aware that binders for catalogues and the like have been proposed in which the backs, or the inner edges, of the papers were to be perforated and firmly clamped between two plates forming a holder, a series of such holders being arranged within a single cover, but so far as I am aware no one has hitherto proposed to construct a loose leaf binder with a series of separate and distinct divided-ring leaf holders carried by a flexible sheet within the cover whereby they might lift from the back, and assume whatever plane might be necessary to enable the leaves of successive holders to lie flat upon one another when the binder is open. I also believe myself to be the first to employ in a single cover a plurality of leaf holders adapted when the book is closed to inter-mesh, or fit one into another, and thereby to reduce the space occupied by the holders when the cover is closed. These features I desire to cover broadly while also securing, in greater or less breadth, the more specific details of construction. In other words

Having thus described my invention what I claim is:

1. A loose leaf binder comprising an outer cover; a flexible sheet extending across the back or middle section of the cover on its interior; and a plurality of divided-ring leaf-holders carried by said flexible sheet.

2. In a loose leaf binder, the combination of an outer cover comprising cover boards and an intermediate back section; a flexible sheet extending across the inner face of the back section from cover board to cover board, but free to move face-wise away from the back section; and a plurality of sheet holders secured to said flexible sheet, each holder comprising a series of

hinged fingers or curved members adapted to have their free ends separated or brought together at will, substantially as set forth.

3. In a looose leaf binder, a leaf-holder comprising plates *a*, *b*, each provided with fingers *j;* a hinge rod *c;* stirrups *g* straddling the hinge rod, and having upturned ends to engage the inner edges of the plates *a*, *b;* and a rod D passing through the stirrups and having cut away or reduced portions which under one adjustment of the rod permit the stirrups to drop and the plates to separate, and under another adjustment of the rod serve to move said plates toward each other and their fingers to meet.

4. In a loose leaf binder, the combination with an outer cover of a flexible sheet lying within the back section of the cover but detached therefrom; and a leaf-holder comprising separable hinged plates *a*, *b*, and a hinge rod *c*, the flexible sheet being provided with loops *e*, and the hinge rod *c* being passed through said loops and serving thereby to attach the holder to the flexible sheet.

5. In a loose leaf binder, a leaf-holder comprising plates *a*, *b*, provided with fingers *j;* a hinge rod *c* uniting said plates; stirrups *g* straddling the hinge rod and having upturned ends engaging the inner edges of the plates *a*, *b;* a rotatable rod D arranged within the loops of the stirrups *g*, and having eccentric portions *h;* and springs *k* bearing against the plates *a*, *b*, and serving when said plates are unlocked to separate the same.

6. In a loose leaf binder, a leaf-holder comprising plates *a*, *b*, having fingers *j;* hinge rod *c* uniting said plates; stirrups *g* straddling the hinge rod, and having upturned ends engaging the inner edges of the plates *a*, *b;* rod D having reduced portions *h* seated within the stirrups; and a cover board F extending from plate *a* to plate *b*, and having fingers extended between the fingers *j* of the plates and bent inwardly toward the hinge rod.

7. In a loose leaf binder, a leaf-holder comprising plates *a*, *b*, provided with fingers *j;* hinge rod *c* connecting said plates; rod D extending lengthwise of and parallel with the hinge rod *c*, and provided with reduced portions *h;* stirrups *g* straddling the rods D, *c*, and having upturned ends engaging plates *a*, *b;* springs *k* located between and serving to separate the plates *a*, *b;* and a resilient cover plate F extending from plate *a* to plate *b* between the free ends of the fingers *j* and the rod D, substantially as set forth.

8. In a loose leaf binder, the combination of a flexible holder-carrying sheet B provided with loops *e;* and a leaf-holder C comprising fingered plates *a*, *b*, a hinge rod connecting said plates, and means for separating and for drawing together the fingers of said plates, the hinge rod *c* of said holder passing alternately through the loops *e* of the flexible sheet, and through the hinge-eyes of the plates *a*, *b*, whereby the holder is secured to the flexible sheet.

9. In a loose leaf binder, the combination of an outer cover comprising cover boards and an intermediate back section; and a plurality of leaf-holders secured within said cover, each holder having a series of impaling or leaf-carrying fingers, the fingers of one holder being alternated with those of another holder whereby the different holders are adapted to intermesh, substantially as described.

10. In a loose leaf binder, a leaf-holder comprising plates *a*, *b*, provided with fingers *j;* hinge rod *c* connecting said plates; rod D extending lengthwise of and parallel with the hinge rod *c*, provided with reduced portions *h;* stirrups *g* straddling the rods D, *c*, and having upturned ends engaging plates *a*, *b;* and a resilient cover plate F extending from plate *a* to plate *b* between the free ends of the fingers *j* and the rod D, said plate being longitudinally corrugated, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN L. McMILLAN.

Witnesses:
E. F. MORAN,
L. M. DE CLERCQ.