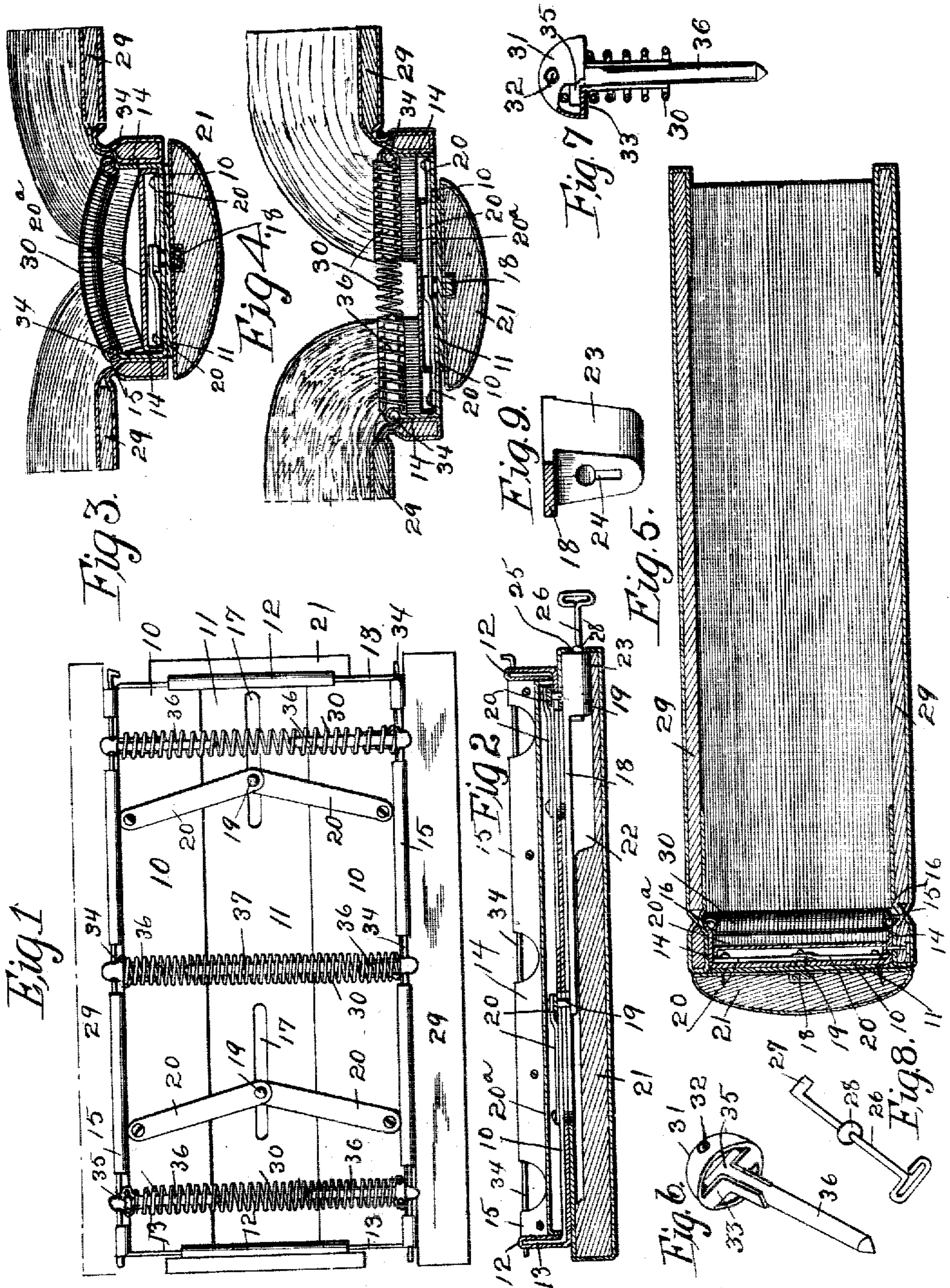


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G. H. MANGER.  
LOOSE LEAF BOOK.

APPLICATION FILED MAY 23, 1905.



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# UNITED STATES PATENT OFFICE.

GEORGE H. MANGER, OF DES MOINES, IOWA, ASSIGNOR OF ONE-FOURTH  
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## LOOSE-LEAF BOOK.

No. 811,730.

Specification of Letters Patent.

Patented Feb. 6, 1906.

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*To all whom it may concern:*

Be it known that I, GEORGE H. MANGER, a citizen of the United States, residing at Des Moines, in the county of Polk and State of Iowa, have invented a certain new and useful Loose-Leaf Book, of which the following is a specification.

My object is to provide a book of the class in which the leaves are held together by means of coil-springs passed through openings therein and pivotally connected at their ends with the sides of the book-binding, so that the book may open flat and so that the leaves may be bodily removed with the springs in position to serve as permanent connecting means for the leaves after they have been removed from the cover.

A further object is to provide an expansible back-frame for the book whereby it may be adapted for books of different thicknesses and also to provide means for locking said expansible back to prevent the removal of the leaves; and my object is, further, to provide attachments for the connecting-springs by which they may be prevented from curving and yet be permitted to expand freely.

My invention consists in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

Figure 1 shows a plan view of the expansible back-frame with the leaf-retaining springs in position. Fig. 2 shows a central longitudinal sectional view of the back-frame. Fig. 3 shows a central transverse sectional view through the central portion of the book, the book being shown in its flat open position. Fig. 4 shows a similar view with the expansible back in its extended position and with the means for holding the springs against bending, the leaves of the book spaced apart at their central portions. Fig. 5 shows a transverse sectional view of the book in its closed position. Fig. 6 shows a detail perspective view of one of the spring-stiffening rods with its detachable cap. Fig. 7 shows a side elevation of same with a spring connected therewith. Fig. 8 shows a detail perspective view of the key, and Fig. 9 shows a detail perspective view of the lock device.

The expansible back-frame comprises two

outer members 10 and a central member 11, the outer ones capable of sliding in and out over the member 11. At the ends of the member 11 are the end pieces 12, extended first upwardly, then inwardly, and then downwardly, and on the ends of the parts 12 are the end pieces 13, which are slidably mounted in the parts 12. At the outer sides of the parts 10 are the outwardly-extended side pieces 14, provided with loops 15 at their tops, said loops on each part 10 being in line and designed to receive a detachable rod, hereinafter described. In the central portion of the part 11 are the longitudinal slots 17, and below the part 11 is a longitudinally-arranged sliding bar 18, provided with pins 19, extended upwardly through the slots 17. These pins are pivotally connected to the arms 20, which arms extend outwardly and are pivoted to the parts 10, as clearly shown in Fig. 1. In order to prevent these movable arms from coming into contact with the back of the leaves, I provide a shield 20<sup>a</sup> to inclose said arms, which shield has its edges resting on the parts 10 and has a space between it and the parts 10 and 11 large enough to permit said arms 20 to freely move therein. By this arrangement a longitudinal movement of the parts 18 in one direction will cause the arms 20 to bring the sides 10 toward each other, while a movement of the part 18 in the opposite direction will spread the parts 10.

Secured to the under surface of the part 11 is the segmental back-piece 21, formed with a longitudinal opening 22 to receive the bar 18. On one end of the bar 18 is a lock extension 23, formed with a key-opening 24. The part 18, with its extension 23, is wholly inclosed within the back 21, except for the keyhole 25, in line with the keyhole 24. The form of key used in connection with this form of device comprises a straight shank 26 with a right-angled extension 27 on one end and a shoulder 28 near its central portion, said shoulder being large enough to pass through the keyhole 25, but not through the keyhole 24, and the space between the shoulder 28 and the part 27 is of substantially the same length as that of the part 23, so that the key may be passed through the keyhole 25 and through the keyhole 24 and then turned at right angles, whereupon the part 18 may be moved longitudinally in either direction by means



of said key. In this way the part 23 is made to serve the purpose of a central lock.

The sides of the book are indicated by the numeral 29 and are connected with the sides 5 14 of the expansible back-frame. I connect the leaves with the expansible back-frame by extending through them the contractible coil-springs 30. At each end of each spring is a cap substantially hemispherical in shape 10 (indicated by the numeral 31) and having an opening 32 extending through it and also having on its flat side the arms 33, extending first inwardly toward each other and then again at right angles to the flat side, said ends 15 parallel with each other. I connect these caps with the springs 30 by placing the end coils of said springs between the flat sides of the caps 31 and the parts of the arms 33 parallel with said flat sides, as clearly shown in 20 Fig. 7. This may be quickly and easily done by inserting the end of a coil inside of one of the arms 33 and then turning the coil with a screw-like movement. The ends of the arms 33 farthest from the cap will stand inside of 25 the coil, as shown in Fig. 7. In this way the caps are firmly but detachably connected with the coils. I attach the caps to the sides of the expansible back by means of rods 34, which pass through the loops 15 and through 30 the openings 32 in the caps 31. In this way a pivotal detachable connection is provided, and all of the springs may be quickly detached from the expansible back-frame by withdrawing the rods 34.

35 In some instances it is desirable to prevent the coil-springs from curving, as shown in Fig. 3, when the book is open, and yet it is desirable to have springs that will expand. For this purpose I place in the two end 40 springs 30 stiffening-rods extending from the end toward the center, and in the central spring 30 I provide a stiffening-rod to extend across the center of the spring to brace near its ends, so that the stiffening-rods in the end 45 spring will prevent the springs from curving near their ends, while the stiffening-spring in the central rod will prevent the springs from curving at their central portions. These end stiffening-rods each comprise a head 35 and a 50 shank 36, said head designed to enter between the arms 33 and engage the shoulders in said arms, as clearly shown in Figs 6 and 7. I place the stiffening-rods in the caps first, as shown in Fig. 6, and then insert the rod in the 55 end of the spring 30 and place the end of the coil between one of the arms 33 and the head 35 of the stiffening-rod and then by a twisting movement turn the spring to the position shown in Fig. 7, thus securely holding the 60 stiffening-rod in the spring. The central stiffening-rod (indicated by the numeral 37) consists simply of a smooth round rod inserted in the central portions of the central spring.

65 In practical use and assuming that it is de-

sired to use the book as a loose-leaf flat-opening book I assemble the parts with the stiffening-rods, as shown in Fig. 3, the leaves being provided with openings to receive the 70 springs 30 and slotted from the said openings to the adjacent leaves thereof in the ordinary way. The said springs serve to hold the sides of the back-frame together, and when the book is open the ends of the springs will turn on the rods 34 and the central portions 75 of the springs will curve upwardly, thus permitting the book to open flat. The elasticity of the springs will permit the book to be enlarged within certain limits, and if it is desired to remove some of the leaves the sides 80 of the expansible back may be separated by moving the bar 18 longitudinally, as before explained, and then removing the leaves in the ordinary way. If it is desired to bodily 85 remove all of the leaves, I simply withdraw both the rods 34 and then remove the leaves, leaving the springs in position therein to serve as a permanent binder therefor, the caps on the springs holding the leaves together. If it is desired to prevent the springs 90 from curving, as shown in Fig. 3, and yet provide a loose-leaf book, leaves of the same kind are used and the stiffening-rods inserted in the springs, as before explained. If it is 95 desired to provide a book in which the individual leaves cannot be removed, then leaves are provided with openings for the springs, but not with slots extending from the openings to the margins. When the leaves are in position in the book, the sides of the expan- 100 sible back-frame are locked in position, so that the back cannot be expanded for the purpose of removing the leaves.

Having thus described my invention, what I claim, and desire to secure by Letters Pat- 105 ent of the United States therefor, is—

1. In a book, the combination of a back-frame, rods detachably connected with said back-frame, coil-springs, caps on the ends of the coil-springs, having said rods passed 110 through them to pivotally connect them with the back-frame.

2. In a book, the combination of a back-frame, rods at the sides of the back-frame, coil-springs and caps for the coil-springs, 115 each provided with a head formed with an opening to receive a rod and also formed with arms extended away from the head, then toward each other forming shoulders designed to engage the coils of the springs and secure 120 the caps to the springs, said rods passed through the openings in said caps.

3. In a book, the combination of a back-frame, coil-springs connected at their ends to the sides of the back-frame and two stiffen- 125 ing-rods detachably inserted in the ends of the springs, and spaced apart at the centers of the springs.

4. In a book, the combination of a back-frame, coil-springs connected at their ends to 130



the sides of the back-frame and two stiffening-rods at the opposite ends of one of the springs and one stiffening-rod at the central portion of one of the springs.

5 5. In a book, the combination of a back-frame, rods detachably connected to the sides of the back-frame, a number of coil-springs, caps for the ends of the coil-springs each comprising a body portion formed with  
10 an opening to receive said rod and also formed with arms having shoulders thereon to receive the ends of the coil-springs, headed stiffening-rods inserted in some of said arms, said heads engaged by the shoulders and a  
15 stiffening-rod at the central portion of one of the coil-springs.

6. In a book, a back-frame comprising a central strip formed with longitudinal slots and with its ends inclined upwardly, inwardly and downwardly, side pieces slidingly  
20 connected with the central piece and provided with side margins formed with loops and end margins slidingly inserted in the end portions of the central piece, the sliding bar  
25 below the central piece, pins passed through the slots in the former piece, arms pivoted to said pins extended outwardly and pivoted to the side pieces of the frame whereby longitudinal movement of the bar will move the side  
30 pieces inwardly and outwardly relative to each other and contractible coil-springs connected to the upturned side edges of the side pieces.

7. In a book, a back-frame comprising a  
35 central strip formed with longitudinal slots and with its ends inclined upwardly, inwardly and downwardly, side pieces slidingly

connected with the central piece and provided with side margins formed with loops and end margins slidingly inserted in the end  
40 portions of the central piece, the sliding bar below the central piece, pins passed through the slots in the central piece, arms pivoted to said pins extended outwardly and pivoted to the side pieces of the frame whereby longitudinal  
45 movement of the bar will move the side pieces inwardly and outwardly relative to each other and a locking-lug formed with a keyhole connected to said bar.

8. In a book, a back-frame comprising a  
50 central strip formed with longitudinal slots and with its ends inclined upwardly, inwardly and downwardly, side pieces slidingly connected with the central piece and provided with side margins formed with loops  
55 and end margins slidingly inserted in the end portions of the central piece, the sliding bar below the central piece, pins passed through the slots in the central piece, arms pivoted to said pins extended outwardly and pivoted to the  
60 side pieces of the frame whereby longitudinal movement of the bar will move the side pieces inwardly and outwardly relative to each other, a locking-lug formed with a keyhole connected to said bar, a back-piece con-  
65 nected with the said central portion of the back-frame, said back-piece formed with a recess to receive the sliding bar and locking-lug, said back-piece also formed with a keyhole in line with that of the locking-lug.

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