

Sept. 25, 1956

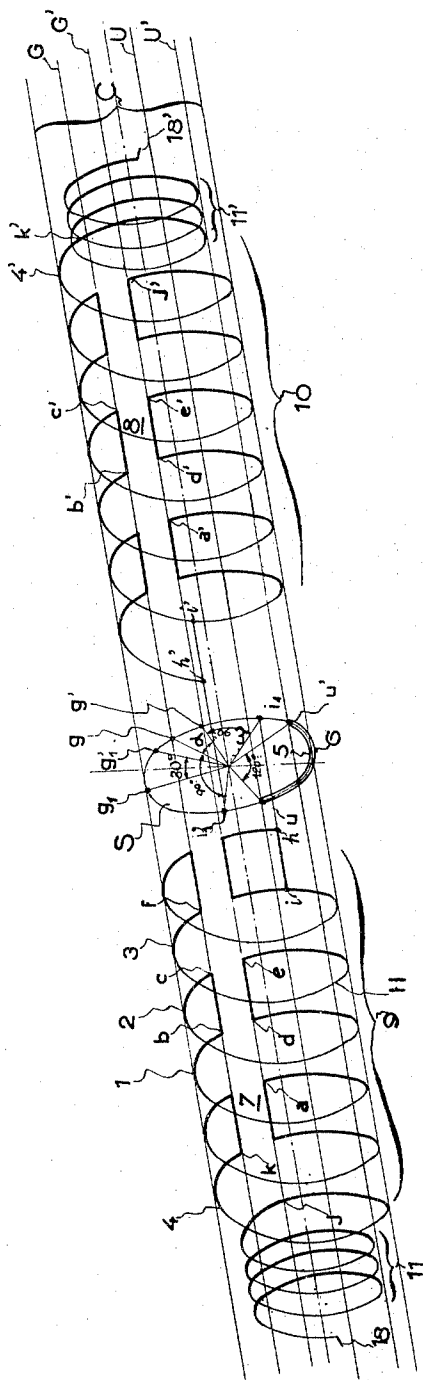
D. E. VALLA
LOOSE-LEAF BINDINGS

2,764,162

Filed June 23, 1954

6 Sheets-Sheet 1

FIG. 1



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6 Sheets-Sheet 2

FIG. 2

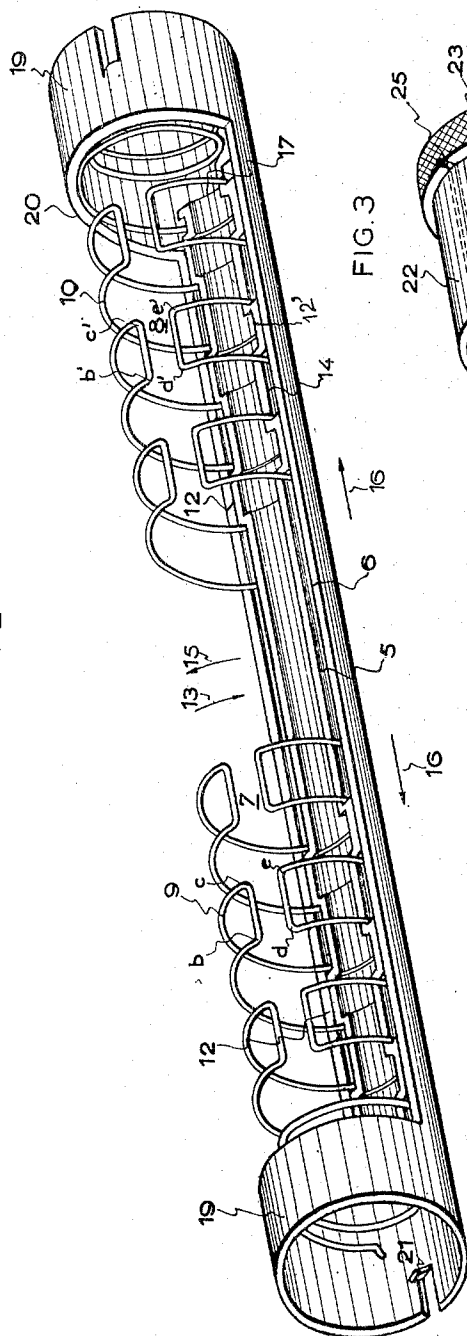
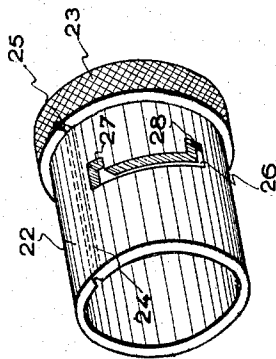


FIG. 3



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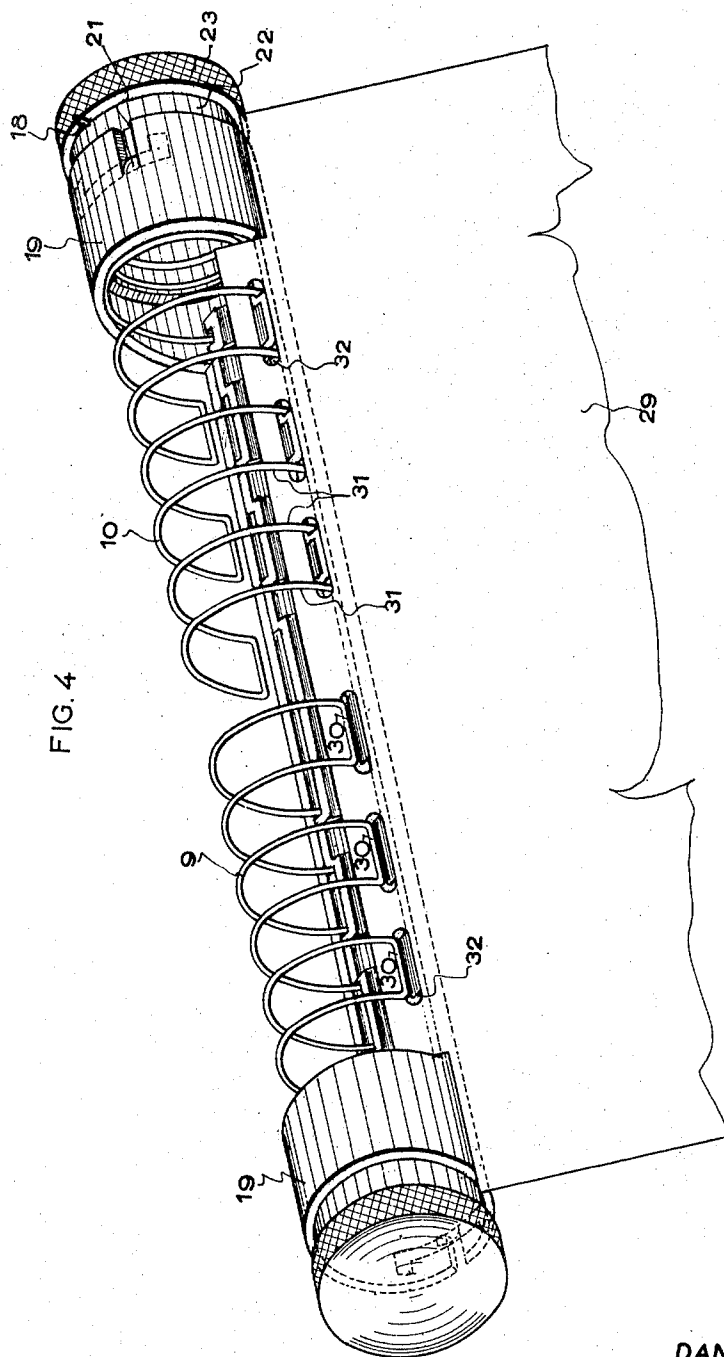
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6 Sheets-Sheet 3



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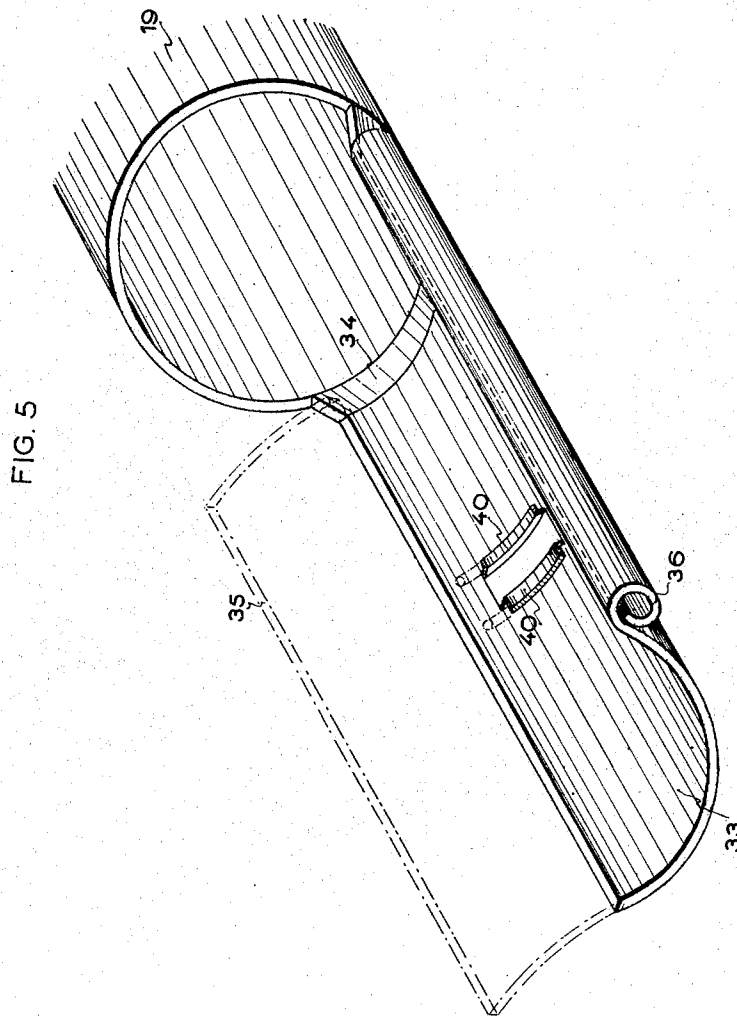
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6 Sheets-Sheet 4



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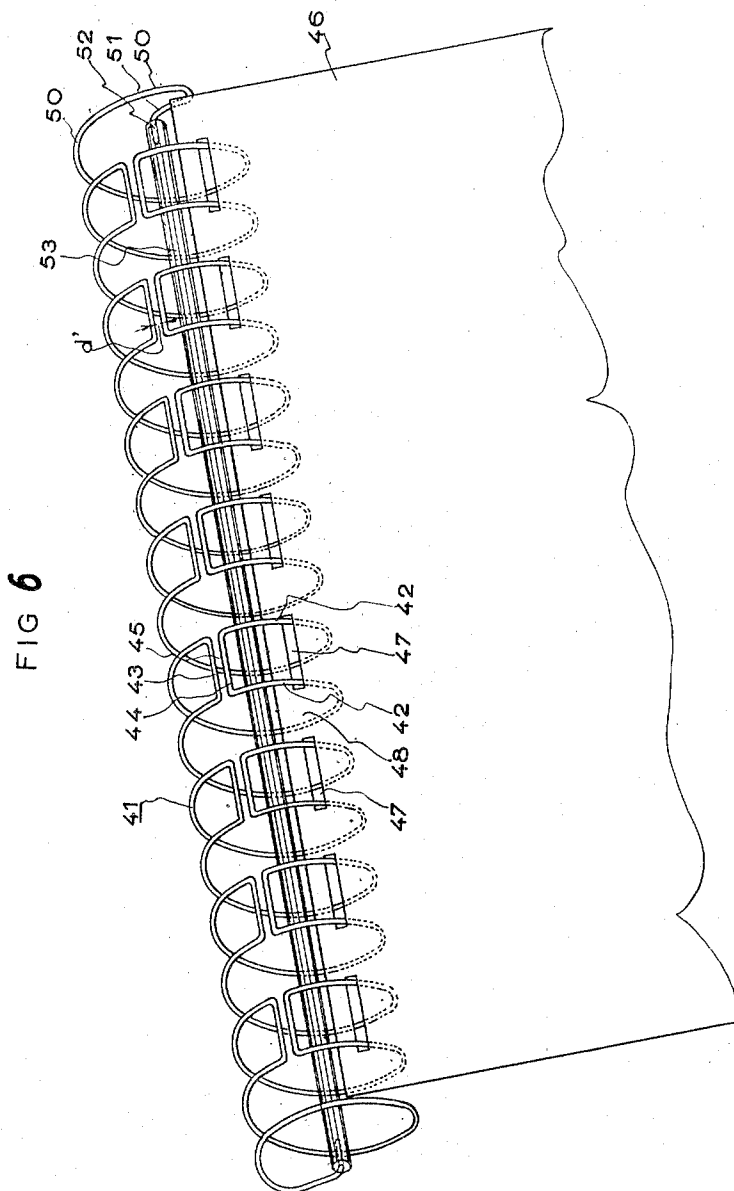
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6 Sheets-Sheet 5



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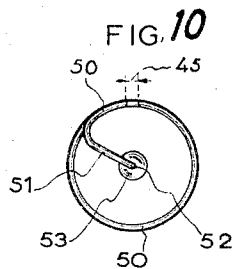
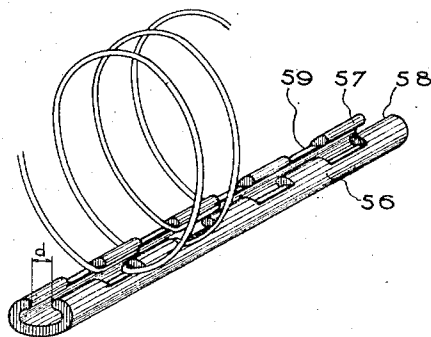
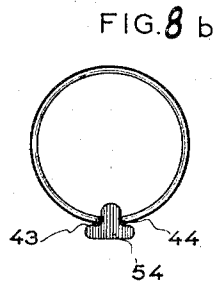
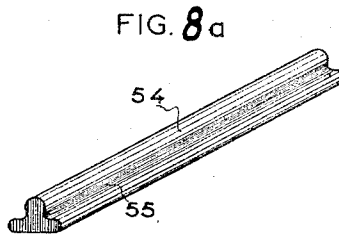
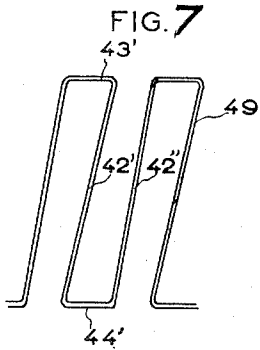
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LOOSE-LEAF BINDINGS

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6 Sheets-Sheet 6



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2,764,162

LOOSE-LEAF BINDINGS

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Application June 23, 1954, Serial No. 438,691

Claims priority, application France June 27, 1953

6 Claims. (Cl. 129—1)

The present invention relates to a loose-leaf binding.

In bindings for perforated sheets of the prior art, a metallic wire having the shape of a castellated festoon or grecque comprising successive first and second straight portions at right angles from each other is rolled about a longitudinal axis to form a cylindrical structure in such a manner that the first straight portions of the grecque become circular claws or loops and the second straight portions remain rectilinear and aligned along two longitudinal spaced apart lips of a slot. In these bindings, the circular claws are in planes perpendicular to the longitudinal axis of the structure and the rectilinear portions respectively aligned along the two lips of the slots are not in front of each other but would be in juxtaposed alignment if the width of the slot were reduced to zero. It results from this structure that if sheets perforated with oblong holes are inserted on the binding with the rectilinear portions, aligned along one lip, passing through the holes, the sheets will bump against the rectilinear portions aligned along the other lip and cannot jump over the slot. Consequently the rotation of a sheet around the binding is limited to at most 360° and the insertion or the withdrawal of a single sheet will involve the insertion or the withdrawal of all the sheets comprised between said sheet and the last sheet of the binding.

An object of the present invention is to provide a loose-leaf binding which will enable a single sheet or a group of sheets to be removed or re-inserted without having to handle the other sheets contained in the binding. This binding comprises a coil or helix of metallic wire defining a circular cylinder and having aligned lips consisting of portions of metallic wire having an axial direction, the said lips passing into rectangular slots made in the sheets to be bound. The turns of the helix are interrupted and have a slot between two generatrices of the circular cylinder formed by the helix. The interrupted turns are connected by axial portions of the metallic wire which extend along the generatrices that bound the slot, a given interrupted turn being connected to the preceding turn by an axial portion of wire situated along a generatrix and to the following turn by an axial portion of wire situated along the other generatrix. The axial portions of the binding respectively aligned on the two lips of the slot are in front of each other and the sheets can jump over the slot, each sheet being capable of a rotation of approximately 720° about the binding.

In certain models, the slot may be covered by means of operating buttons between two guides having the shape of cylindrical sectors which are coaxial with each other and with the coil. These guides form the back of the binding. In the covered position of the slot the sheets are kept bound together by the turns of the coil. This covered position of the slot is the position of closure of the binding.

In the models, in order that, in the course of the operations of opening and closing the binding, the sheets should not be capable of ever escaping accidentally, the coil consists of two independent half-coils which oper-

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ate in opposite directions. In this way, the sheets are always kept together by means of a half-coil.

In other, simplified models, the coil with interrupted turns is integral and the guides forming the back of the binding are dispensed with. This model is relatively cheap, the cost being substantially the same as that of continuous coil bindings. In these latter models:

1. The lips which bound the axial slot of the turns of the coil are very close together, so that only a few loose sheets may be simultaneously introduced into or removed from the binding.

2. The spring formed by the coil is subjected to a slight extension with the aid of an axial strut.

3. The slot is normally closed by a locking bar which is withdrawn when sheets are introduced or removed.

The invention will be better understood on reading the detailed description which will now be given and on referring to the accompanying drawings in which Figures 1 to 5 relate to the first model of binding comprising a back and Figures 6 to 10 relate to the simplified model; in particular.

Figure 1 represents diagrammatically the two half-coils;

Figure 2 represents the two half-coils and the two coaxial guides, one being inside and one outside;

Figure 3 represents one of the operating buttons;

Figure 4 represents a binding holding a loose sheet;

Figure 5 represents a modification of the removable binding;

Figure 6 is a perspective view of the simplified loose binding, with the locking bar removed;

Figure 7 represents a pattern of metallic wire which is used for manufacturing the binding;

Figures 8a and 8b show a first type of locking bar;

Figure 9 shows a second type of locking bar; and

Figure 10 is an end view of the coil, showing a detail of construction.

Referring to Figure 1 the two half-coils have the following geometrical structure:

Let C be a cylinder and G and G' be two cylinder generatrices at an angular distance α from each other of the order of 30° for example, and let H be a coil called a "mother coil" traced on this cylinder. An iron wire is superposed on the outline of this coil between the points a and b, the point a being on the generatrix G' and the point b being on the generatrix G, the portion b—c of the generatrix G is then followed with the iron wire, then the coil portion c—d, the point c being on the generatrix G and the point d being on the generatrix G', then the portion d—e of the generatrix G', then the coil portion e—f and so on. It is seen that the iron wire describes the turns of the coil with the exception of the part of these turns between the generatrices G and G' and, in addition, describes portions of these generatrices comprised between the two same adjacent helical turns and opposite each other. For example, the turns 1 and 2 are connected together by a straight-line portion b—c and the turns 2 and 3 are connected together by a straight-line portion d—e opposite b—c, whilst there is no straight-line portion between the points a—d joining the intersections of the turns 1 and 2 with the generatrix G' or between the points c—f joining the intersections of the turns 2 and 3 with the generatrix G.

The straight-line portions such as b—c and d—e constitute the lips of the coil. Unlike to the prior art bindings referred to, these rectilinear portions are opposite each other and the turns are helical, whereas in those bindings the rectilinear portions are intertwined and the turns are circular ones. The generatrices G and G' bound a slot 7 on the half-coil 9 and a slot 8 on the half-coil 10.

A half-coil is terminated by a returning straight-line

portion $h-i$ extending along a generatrix of the cylinder C. The returning straight-line parts $h-i$ and $h'-i'$ of the two half-coils are situated at the opposite ends. Their angular position is determined hereinafter.

At its outer end, each half-coil first of all comprises a whole turn 4 (or 4') between the point j on the generatrix G' and the point k on the generatrix G which has the same pitch as the mother coil, then an extensible part 11 (or 11') comprising a number of turns which are closer together and the diameter of which is less than that of the cylinder C, the last turn being terminated by a small radial part 18 (or 18') which extends outwardly.

The coils are guided between two guides 5 and 6 which are sectors having a cylindrical surface and which are coaxial with each other and with the half-coils. These guides are made of thin sheet metal for example and have an angular development of the order of 120° . In Figure 1, the edges of the guides are represented diagrammatically by generatrices U and U' of the cylinder C.

The half-coil 10 has a structure which is identical with that of the half-coil 9, and the reference characters which denote its different parts being the same but marked with a prime.

If a cross-section S of the cylinder C is drawn, the edges G, G', U and U' project at g, g', u and u' on this section and the axis of the cylinder projects at ω . If,

as has been assumed, the angle $\widehat{g \omega g'}$ is 30° and the angle $\widehat{u \omega u'}$ is 120° and, if it is assumed that the position of the slots which is most favourable for the introduction of the sheets is that in which the radial plane which passes through the middle of the slots 7 and 8 coincides with the radial plane which bisects the cylindrical sectors that constitute the guides, that is to say bisects the

angle $\widehat{u \omega u'}$ (in this position the lips of the slot project on the cross section at g_1 and g_1'), it is necessary in order to cover the slot 7 between the guides 5 and 6, to rotate it through an angle which is, at least, equal to

$\widehat{g_1 \omega u'}$, i. e. $120^\circ + 15^\circ = 135^\circ$, and, in order to cover

the slot 8, to rotate it through an angle $\widehat{g_1' \omega u}$ of the same minimum value and of opposite direction.

The axial returning portion $h-i$ projects at i_1 from the cross-section of the cylinder. In order that this returning portion should itself be covered between the guides when the slot is closed (ωg_1 coinciding with $\omega u'$), it is necessary that the angle $\widehat{g' \omega i_1}$ should, at most, be equal to $120^\circ - 30^\circ = 90^\circ$. If the latter value is chosen, the radius $\omega-i_1$ coincides with $\omega-u$ when the radius $\omega-g$ coincides with $\omega-u'$. In the same way, if i_1' denotes the projection on the cross-section S of the axial

return $h'-i'$, the angle $\widehat{g \omega i_1'}$ is also equal to 90° .

The inside guide 5 (Figure 2) comprises helical protuberances and indentations 12, produced by a stamping, of the same pitch as the half-coils and of such depth that the convex surface of these protuberances, on coming into contact with the unembossed concave surface of the outer guide 6, makes, in the unembossed part between the two guides, channels 14 of rectangular cross-section of a height which is equal to the pitch of the half-coils, increased by the diameter of the wire, and of a thickness which is slightly greater than the diameter of the wire of the turns. The two guides 5 and 6 are assembled together by, for example, gluing or soldering. It will be observed that the straight-line portions such as $d-e$ of the half-coil 9 can be covered between the guides by rotating this half-coil in the direction of the arrow 13, whilst the straight-line portions such as $b-c$ come into contact with the indentations 12 when the half-coil is rotated in the direction of the arrow 15. For the second half-coil 10, it is the straight-line parts such

as $b'-c'$ which can be covered up, when this half-coil is rotated in the direction of the arrow 15, and the straight-line parts such as $d'-e'$, which come into contact with the indentations 12' when it is rotated in the direction of the arrow 13. The result of this is that, as the slots 7 and 8 are covered between the guides, the opening, which is the operation that consists in placing the said slots in alignment and, for example, in the plane bisecting the angle of opening of the guides, is effected by rotating the two half-coils in opposite directions, the half-coil 9 in the direction of the arrow 15 and the half-coil 10 in the direction of the arrow 13. The arrangement of the helical protuberances in relation to the turns of the half-coils is such that, in the course of the opening movement, the two half-coils are separated from each other (direction of the arrows 16) whilst they approach each other in the course of the closing movement.

At the two ends of the loose binding, the inner guide has a helical sunken edge 17, the function of which is to prevent any longitudinal deformation of the first turn of each half-coil when longitudinal pulls are produced by means of the button for the purpose of unlocking them, as will be hereinafter explained. The outer guide 6 (Figures 2 and 3) is terminated by hollow cylindrical parts 19, the inner edges 20 of which are coil portions having the same pitch as the mother coil. In this way, the sheets are not hindered in their rotation.

A small tongue 21 is cut in the outer edge of each cylindrical part 19 and it is turned up, in the assembling, into a groove made in the operating buttons which will now be described.

The operating buttons 22, are portions of a hollow cylinder having, as external diameter, the internal diameter of the end cylindrical parts 19, into which they pass, and, as internal diameter, that of the parts 11 (or 11') of the coil. One of the ends of the buttons 22 has a flange 23 which can be milled to facilitate operation. Made in the internal surface is a groove 24 terminating in a radial hole 25. The buttons comprise, in addition, a helical slot 26 having two axial returns 27 and 28. When the button 22 is pushed into its housing 19 on assembling the binding, the end of the radial termination 18 (or 18') of the helical wire is guided in the groove 24 up to the hole 25 where it engages and becomes locked. The hole 25 is made in the part of the button forming the flange in order that the radial termination 18 should not project on the outer wall of the button. The small tongue 21 is then turned up into the slot 26, thus preventing the removal of the button and limiting its rotation. The elastically deformable parts of the half-coils, i. e. 11 and 11', are dimensioned in such a manner as to be extended slightly when the returning portions 18 and 18' are engaged in the holes 25 of the operating buttons. In this way, the small tongues 21, which play the part of stops, also play the part of locks, because it is necessary, before any operation, to effect a longitudinal displacement of the button in opposition to the pull of the coil 11 in order to disengage these small tongues from the housings 27 and 28 of the button.

In Figure 4, a sheet 29 is seen held by the loose binding. The turns 31 of the half-coil 10 pass through rectangular slots 32 made in the sheet, and the lips 30 of the half-coil 9 are represented at the moment when they are going to pass into the said slots 32.

For the industrial manufacture of the binding, it may be advantageous, with a view to economy and lightness, to dispense with the internal guide. In that case, a tube 33 (Figure 5) of thin sheet metal is taken, the ends of which constitute the end cylindrical parts 19 which serve as a housing for the buttons. This tube has, at 34, a hammered-out part and is open along a generatrix 35. The parts which are not included between the generatrix U and U' of Figure 1 are wound on themselves as represented at 36 sufficiently tightly for the volume of the part of the binding comprising these windings to be the same

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as the volume of the part 19. The windings 36 contribute to the longitudinal rigidity of the binding.

Angle bars 40 inside the tube 33 are obtained by bending twice at right angles portions of the surface of the tube which are limited by two generatrices and two circular sections. These angle bars 40 play the part of the channels 14 of Figure 2 and they contribute to the transverse rigidity of the binding.

Referring to Figure 6, 41 denotes the coil which is of the general type of one of the half-coils of Figure 1. The coil comprises turns 42 of circular shape and axial portions 43 and 44 which form the lips of a slot 45. The lips of this slot are almost contiguous so that it is impossible to introduce there more than a few sheets at a time.

The sheets 46 are formed with holes 47 of rectangular shape, through each of which two adjacent turns 42 pass. It follows from the structure of the coil that, if the latter is rotated in the holes 47 in a given direction, the axial portions 43 of the coil will come into contact with the parts 48 of the sheets that are situated in the intervals between two adjacent holes 47 and, in the other direction of rotation, the axial portions 44 will pass through the holes 47.

From the point of view of construction, it is advantageous to form the coil from a pattern 49 made of iron wire (Figure 7) which is bent to give a circular shape. The sheets 46 are introduced into the coil in the course of the bending operation and before the lips of the slot are too close together. The parts 43' and 44' of the pattern become the axial portions 43 and 44 of the coil and the legs 42' and 42'' become the turns 42. It will be seen below why the legs 42' and 42'' are slightly convergent and not parallel.

Each end turn, such as 50, is continued a little beyond the slot at 50' in order to serve as a lateral guard for the sheets when they are in the radial plane containing the slot.

The turn 50 then comprises a radial part 51 and an axial part 52 which is inserted in a hole made in a strut 53 extending along the axis of the coil. In order to give the coil rigidity, it is subjected to a very slight extension by the strut 53, the effect of which is to make the turns 42 parallel which, having been produced from two slightly convergent legs 42' and 42'', were not exactly parallel before this extension.

In order that, when turning around the coil, the sheets should not be able to become unbound involuntarily, the slot is normally closed with the aid of a locking bar which is withdrawn on the introduction of fresh sheets or on the withdrawal of old sheets.

Figures 8a and 8b show a first type of locking bar 54 which, in section, has the shape of a push-button. The axial portions 43 and 44 rest on one side and the other of the neck 55 of the locking bar.

Figure 9 represents, in perspective, a second type of locking bar 56 which, in section, has the shape of a C. The edges 57 and 58 have notches 59 which are spaced apart by the distance of the pitch of the coil and are separated by a distance d which is slightly less than the width of the slot increased by twice the thickness of the metallic wire (this dimension is marked d' in Figure 6). The rectilinear portions 43 and 44 of the coil 41 are engaged under the wing portions 57 and 58 by narrowing the slot of the coil.

The locking bars are kept in place owing to the elasticity of the coil. They may be manufactured of plastic material, for example.

What I claim is:

1. A loose-leaf binding comprising at least a helix with a plurality of incomplete helical turns of metallic wire wound around a circular cylinder except between two spaced apart generatrices of said cylinder, in which the helical turns are connected by axial portions aligned along said generatrices and constituting the lips of a slot, an

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axial portion aligned along a given generatrix and an axial portion aligned along the other generatrix being comprised between the two same adjacent helical turns and being opposite each other, said binding cooperating with leaves perforated with rectangular holes, the length of which and the spacing between adjacent holes are substantially equal to the pitch of the helix, and in each of which pass two helical turns of the helix, whereby the leaves can jump over the slot and make substantially two turns about the binding before bumping against the axial portions, and means to close the slot.

2. A loose-leaf binding comprising at least a helix with a plurality of incomplete helical turns of metallic wire wound around a circular cylinder except between two spaced apart generatrices of said cylinder in which the helical turns are connected by axial portions aligned along said generatrices and constituting the lips of a slot, an axial portion aligned along a given generatrix and an axial portion aligned along the other generatrix being comprised between the two same adjacent helical turns and being opposite each other, two end turns of the helix being bent up in radial and axial portions, said binding cooperating with leaves perforated with rectangular holes, the length of which and the spacing between adjacent holes are substantially equal to the pitch of the helix, and in each of which pass two helical turns of the helix, whereby the leaves can jump over the slot and make substantially two turns about the binding before bumping against the axial portions, a strut arranged along the axis of the cylinder and having end holes into which are introduced the axial portions of the end turns and means to close the slot.

3. A loose-leaf binding according to claim 1 in which the means to close the slot comprises a locking bar with axial notches inserted in the slot elastically and which is withdrawn on the introduction or the withdrawal of the leaves.

4. A loose-leaf binding comprising two helices each having a plurality of incomplete helical turns of metallic wire wound around a circular cylinder except between two generatrices of said cylinder angularly spaced by an angle of approximately 30° in which the helical turns of each helix are connected by axial portions aligned along said generatrices and constituting the lips of two slots, one in each helix, an axial portion aligned along a given generatrix and an axial portion aligned along the other generatrix being comprised between the two same adjacent helical turns and being opposite each other, means to coaxially and rotatively secure the two helices to each other, said binding cooperating with leaves perforated with rectangular holes, the length of which and the spacing between adjacent holes are substantially equal to the pitch of the helix, and in each of which pass two helical turns of the helix, whereby the leaves can jump over the slots and make substantially two turns about the binding before bumping against the axial portions, and means to close the slots.

5. A loose-leaf binding according to claim 4 in which the means to coaxially and rotatively secure the two helices comprise two guides, an outer one and an inner one, having the shape of segments of cylinders of an angular development of approximately 120° and coaxial with each other and with the helix, one of the guides comprising helical protuberances or depressions resting on the lateral surface of the other guide, the said protuberances or depressions bounding helical channels in which the two helices can rotate partially, it being possible to insert the lips on one side of the slot of a helix in said channels while the lips on the other side of the slot of the other helix are in contact with the depressions, and the side comprising the said lips not being the same on the two helices in order that the covering of the slots between the guides should take place on rotating the two helices in opposite directions.

6. A loose-leaf binding according to claim 5, wherein the outer guide comprises, at each end, a portion of a hollow cylinder and buttons connected respectively to the two helices and having as housings said cylinder portions.

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