Aug. 3, 1937. V. CATINI 2,089,018

BINDING ELEMENT FOR A STACK OF SHEET MATERIAL AND METHOD OF FORMING THE BINDING ELEMENT

Filed Aug. 7, 1935

Fig. 1

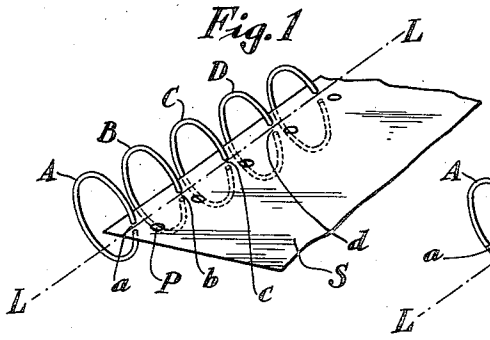


Fig. 2

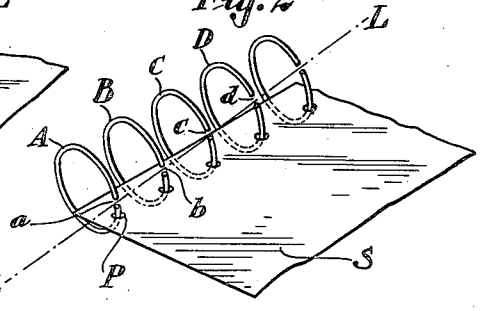


Fig. 3

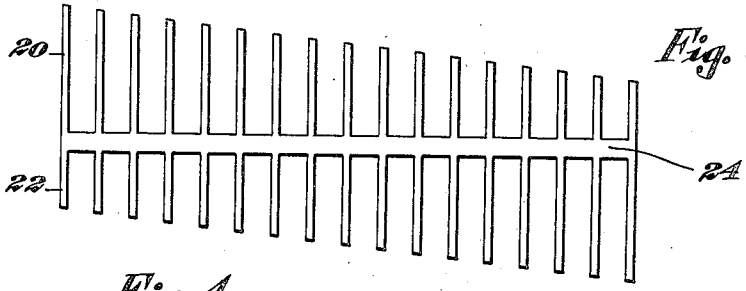


Fig. 4

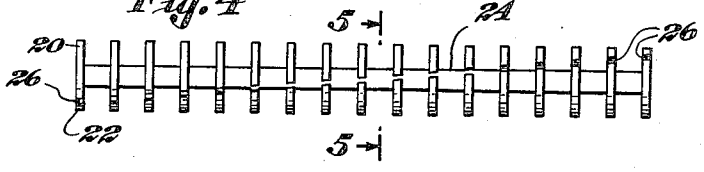


Fig. 5

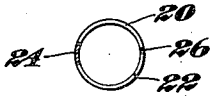


Fig. 6

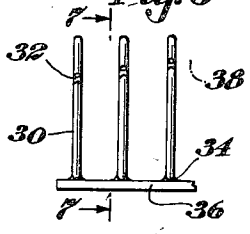


Fig. 7

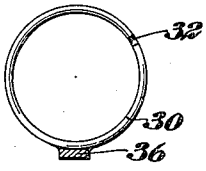


Fig. 8

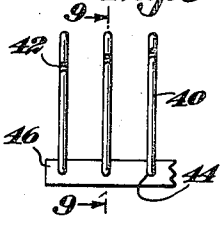


Fig. 9

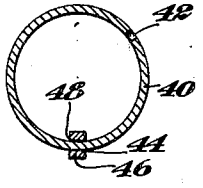


Fig. 11

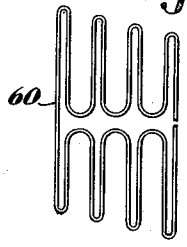


Fig. 12

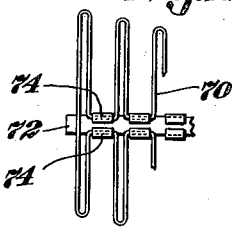
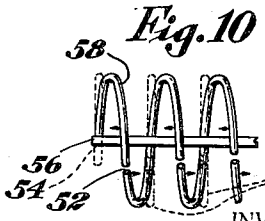


Fig. 10



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BY
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Patented Aug. 3, 1937 2,089,018

UNITED STATES PATENT OFFICE

2,089,018

BINDING ELEMENT FOR A STACK OF SHEET MATERIAL AND METHOD OF FORMING THE BINDING ELEMENT

Vincenzo Catini, New York, N. Y.

Application August 7, 1935, Serial No. 35,051

7 Claims. (Cl. 129—1)

This invention relates in general to the binding of stacks of sheeted material and in particular to that type of bindings for such stacks of sheets customarily known as loose leaf bindings, in which individual sheets of the stacks of sheets are removable and replaceable without destroying the bindings or the sheets.

From another aspect this invention relates to bindings for stacks of sheets of the type in which the sheets of the stack are provided along one edge thereof with registering perforations and the binding consists of a member or members adapted to pass through the said perforations in the stack and thereby to hold the sheets together in stack formation.

While my invention has been described in relation to the binding of stacks of sheeted material it will be understood that as to certain phases thereof it may have other applications.

In the binding of stacks of perforated sheets it has been customary heretofore to employ rings or ring-like members passing through the perforations and thereby uniting the sheets of the stack. Where it has been desired to make a loose leaf construction, that is, one in which the sheets could be removed, the rings have been made with movable portions so that an opening could be made in each ring, serving for the withdrawal or insertion of sheets. For example, the rings may be made in sections adapted to be separated by lateral movement thereof, or they may be made in sections hinged together and separable at one point. The disadvantages of these types of binding are the unnecessarily high cost, due to the great number of parts, and the inconvenience of manipulation because of the number of parts to be moved, and the difficulty of moving them.

Where it has been attempted to bind stacks of perforated sheets by inserting a spirally coiled wire into the perforations thereof, the disadvantage is encountered that in order to remove a sheet or to insert a sheet the wire must be completely disengaged from the stack and this is a comparatively tedious operation.

Among the general objects of my invention is the provision, in a binding for a stack of perforated sheets, of means passing through the said perforations so as to bind the stack together and yet permit the ready removal of any desired sheet without relative movement of any parts of the binding, and at the same time the provision of a binding having the aforementioned characteristics that will be effective to bind the sheets securely together.

I attain these objects by providing a series of ring-like members, open at one point in their circumference, said rings being aligned in relation to the perforations of the stack so that they register therewith, and positioning the successive rings of the series so that the opening of each ring is displaced circumferentially in the same direction from the preceding ring, so that if a line is drawn passing through all the openings it will have a spiral conformation in relation to the axis of the series of rings. This construction will be made more clear in the detailed description.

For the attainment of these objects and such other objects as will hereinafter be described or pointed out, I have illustrated several embodiments of my invention in the drawing; in which:—

Figure 1 is a diagrammatic view illustrating the principles of my invention and illustrating the insertion of a perforated sheet into a binding element constructed according to my invention;

Figure 2 is a view similar to Figure 1 showing the position of a sheet after it has been inserted into the binding element;

Figure 3 is a plan view of a blank adapted for the formation of one embodiment of my invention;

Figure 4 is a side elevation of a binding element formed from the blank of Figure 3;

Figure 5 is a sectional view on the line 5—5 of Figure 4;

Figure 6 is a side elevation of a portion of another embodiment of my invention;

Figure 7 is a sectional view on the line 7—7 of Figure 6;

Figure 8 is a side elevation of a portion of still another embodiment of my invention;

Figure 9 is a sectional view on the line 9—9 of Figure 8;

Figure 10 illustrates a method of forming the construction shown by Figures 8 and 9;

Figure 11 illustrates a step in the process of making still another embodiment of my invention; and

Figure 12 is a view similar to Figure 11 showing a further modification similar to that of Figure 11.

The general principles underlying my invention can best be understood from Figures 1 and 2 which are in diagrammatic form, and it will be observed that these figures show a binding element having a series of parallel, axially aligned rings, four such rings, A, B, C, and D, being shown in the figure. Each of these rings has a small opening at one point thereof, and the opening of

each successive ring is displaced laterally from the opening in the preceding ring, the displacement being the same in the successive rings. If a line L—L be drawn through corresponding portions of the openings of all the rings, it will run along an imaginary cylinder containing all the rings, and have a spiral or helical twist along the surface of said cylinder.

It will be obvious that the members A, B, C, D need not necessarily be circular in conformation, and that when I use the term "ring" I intend it to include any loop or ring-like conformation that will be adapted for the proper functioning of my invention.

On referring to Figure 1 it will be seen that the opening *a* in the ring A is positioned about midway between the top and bottom of the ring, that the opening *b* of ring B is nearer to the top, the opening *c* of ring C still nearer to the top, and finally the opening *d* of ring D is almost at the top. If now a sheet S, having perforations P registering with the openings *a*, *b*, *c*, and *d* is slid edgewise into the said openings, which is readily done by holding the sheet at the proper inclination and slightly warping it, the rings A, B, C, D may be caused to pass into the perforations P and the sheet will then naturally assume the position of Figure 2 in which it is shown as flat, and not warped as in Figure 1. Due to the offset relation of the openings in the rings, and to the fact that the sheet S will naturally assume the position in which its edge lies parallel to the axis of the aligned rings, the series of openings *a*, *b*, *c*, *d* and the sheet will not normally be in registering position, so that, for instance, if the sheet is on a level with the point *a*, it will not be on a level with points *b*, *c* and *d*, and the sheet will be retained in bound relation to the rings B, C, and D, although it would be detachable if held only by the ring A. If it is desired to remove the sheet S, it will be necessary to give it a bias or twist such as was necessary when the sheet was inserted, as in Figure 1, but as this is an unusual and abnormal conformation for the sheet, which always tends to line itself up with its inner edge parallel to the axis of the rings, such conditions practically never occur except when such warping or twisting is effected for the purpose of removing the sheet.

The remaining figures of the drawing show, by way of illustration, a number of practical constructions embodying the principles of my invention as just explained.

Figure 2 shows a blank such as may be stamped from a sheet of metal, in which two series of tines 20 and 22 are shown as projecting laterally in opposite directions from a central rib **24**, and the tines **20** decrease progressively in length while the tines **22** increase progressively in length. The tines **20** and **22** are shown as paired so that opposite each tine **20** is a tine **22** and the combined length of each pair of tines is the same for all pairs. The next step in the manufacture of this form of binding element consists in forming a ring from each pair of tines, leaving a slight opening **26** between the ends of the tines. The result will be the construction shown in Figures 4 and 5, in which a series of similarly sized uniformly spaced parallel rings are aligned longitudinally along the rib **24** and have their openings **26** spirally offset from each other.

Obviously the tines **20** and **22** need not necessarily be integral with rib **24**. They might be separate pieces laid transversely and attached thereto in any suitable or preferred manner.

By referring to Figures 6 and 7 it will be observed that I show therein rings made of rod or wire and having openings **32** therein. These rings are fastened in any suitable way, such as by welding or soldering, as indicated at **34**, to a longitudinally extending rib **36**, so that the openings are spirally offset as indicated by the line **38**.

In Figures 8 and 9 the construction is similar to that of Figures 6 and 7, but the rings **40**, having openings **42**, are shown as passing through perforations **44** in a supporting rib **46**. The openings **42** of the successive rings are, as before, spirally offset. As will be obvious the rings **40** may be held in place in the perforations **44** of the rib **46** in any suitable or preferred manner, as by soldering or welding.

Assembly of the construction just described, as well as that of Figures 6 and 7 may be effected by forming the rings either before insertion into the perforations **44**, or after insertion. If the rings are to be formed after insertion the method might consist in fastening straight wires to the rib **46**, thereby arriving at a construction similar to that of Figure 3, and then forming the rings. However, I have found the method indicated in Figure 10 to be very convenient. According to this method I take a perforated rib **56**, and I thread through the perforations **54** thereof a spirally or helically coiled wire **58**. The spiral **58** is then fastened in place in the rib **56** in any suitable or preferred manner as by swaging, soldering or welding. Openings **52** are then formed by cutting all the coils of the spiral in such a manner that the successive cuts **52** are spirally offset. The final step consists in deforming the coils by pushing the sections thereof on opposite sides of the cut **52** in opposite directions. The result will be a series of rings indicated by dotted lines at **58'**, each ring being held in place in the rib **56**, and the rings having their openings spirally displaced from each other. Obviously if desired a plain rib such as rib **36** of Figures 6 and 7, might be used in connection with this method.

For reasons of economy or for other reasons it may sometimes be found desirable to use the construction indicated in Figure 11, in which the binding element is formed by commencing with an element **60**, similar to the blank of Figure 3, and formed by bending a wire as shown in Figure 11. The steps in making the binding element are then similar to those used in connection with the blank of Figure 3. While this construction is not as rigid as that of Figure 3, since it may readily be separated longitudinally before the binding element is associated with the stack of sheets, it will be observed that after such association has taken place, the stack itself will tend to hold the rings against longitudinal separation.

A construction in which a blank **70** similar to the blank **60** of Figure 11 is employed, is shown in Figure 12. Lateral separation of the rings formed from such blank is prevented by the rib member **72**, which is provided at intervals with pairs of ears **74** that may be bent around portions of the blank **70**, as shown in Figure 12, to clamp them in place and to rigidly hold the rings against longitudinal separation.

While I have shown and described several embodiments of my invention and several ways of practicing the same, it will be obvious that the same may be embodied in many other forms and practiced in many other ways without departing from the spirit thereof, as will be obvious to those skilled in the art, and it will be understood

that the disclosure herein is not to be construed in a limiting sense, but by way of illustration merely, and that I do not limit myself in any way other than as called for by the prior art.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is:—

1. A binding element for a stack of perforated sheets comprising at least three open loops, the opening in each loop being small as compared to its circumference, means for holding said loops in parallel relation and in axial alignment and with the opening in each loop displaced laterally in relation to that of the last successive loop, the direction of displacement for all the loops being the same.

2. As an article of manufacture, a binding element comprising at least three parallel loops coaxially aligned and spaced from each other, a rib member uniting said loops and serving to hold them in said relation, and each of said loops having a small opening therein displaced laterally in the same direction from the next preceding loop.

3. The method of forming a binding element for a stack of sheets having a row of uniformly spaced perforations adjacent one edge thereof, that comprises the steps of associating a supporting member with a helically formed wire in such a way that the coils of the wire are each rigidly supported from said member, cutting through each of said coils at one side thereof so as to divide each coil into two portions and in such a way that the cut in each of the successive coils is laterally displaced in the same direction from the cut in the next preceding coil, and then flexing the coil portions in opposite directions so that a series of parallel rings is formed.

4. A binding element as in claim 2 in which each loop is formed by a pair of parallel filamentary members, connecting portions between each pair of adjacent filamentary members and said members and said connecting portions forming part of a continuous filament, and means on said rib for clamping said connecting portions thereto.

5. The method of forming a binding element for a stack of sheets having a row of uniformly spaced perforations adjacent one edge thereof, that comprises the steps of associating a supporting member with a helically formed wire in such a way that the coils of the wire are each rigidly supported from said member, cutting through each of said coils at one side thereof so as to divide each coil into two portions, and then flexing the coil portions in opposite directions so that a series of parallel rings is formed.

6. A binding element constituted by a continuous filament comprising a section having a plurality of doubled-over portions connected to each other at their open ends, said doubled-over portions being arranged serially in parallel spaced relation, with their open ends arranged in a straight line, and said doubled-over portions being of progressively increasing length, a second section having the same characteristics as said first section and disposed with the open ends of its doubled-over portions in opposed adjacency to the open ends of the doubled-over portions of the other section, and with the shortest doubled-over portions of one section opposed to the longest doubled-over portion of the other section, and said doubled-over portions being curved so as to form a series of parallel open loops.

7. A binding element comprising an elongated member, a plurality of pairs of integral lugs serially arranged on said member, the lugs of each pair being disposed in opposed relation on opposite sides of said member, a plurality of open loops positioned as defined in claim 1, carried by said member, said loops being formed of a continuous filament having portions thereof doubled over in parallel relation to form the loops, and formed into connecting portions of which a pair run between each pair of adjacent loops, and one connecting portion of each pair being clamped between said member and one lug of each pair of lugs.

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