Feb. 21, 1956 L. L. HEY ET AL 2,735,133

HINGE

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Fig. 1.

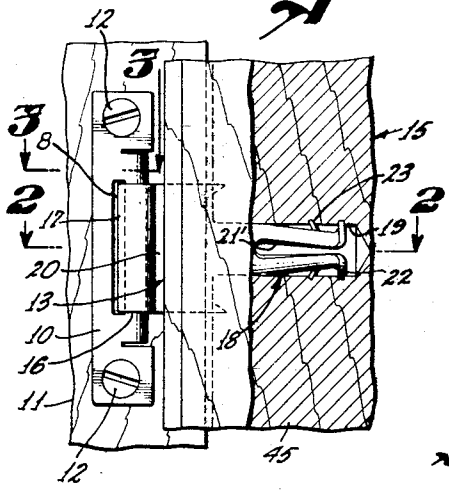


Fig. 2.

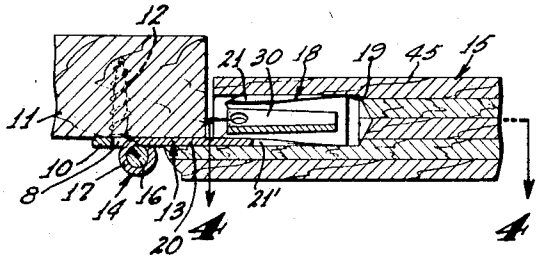


Fig. 5.

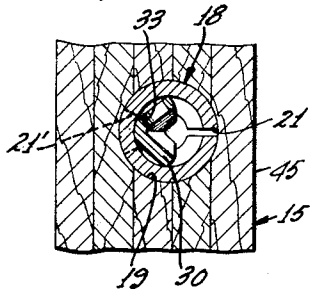


Fig. 3.

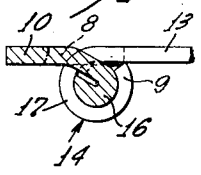


Fig. 6.

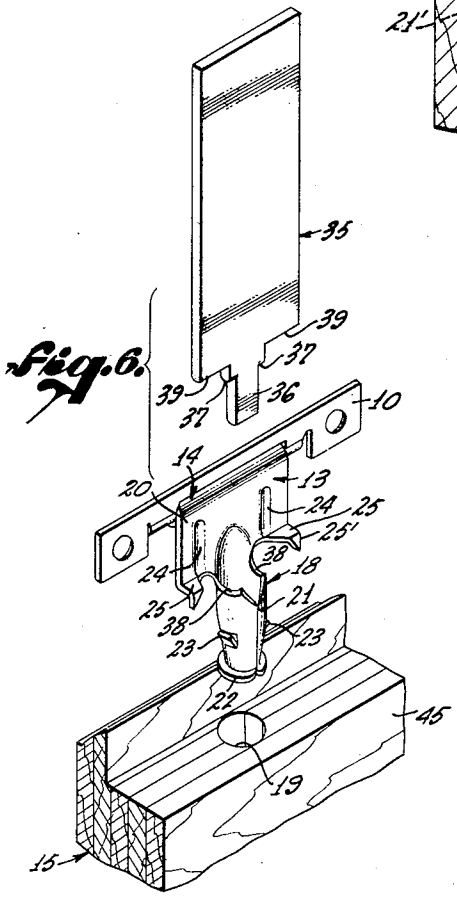
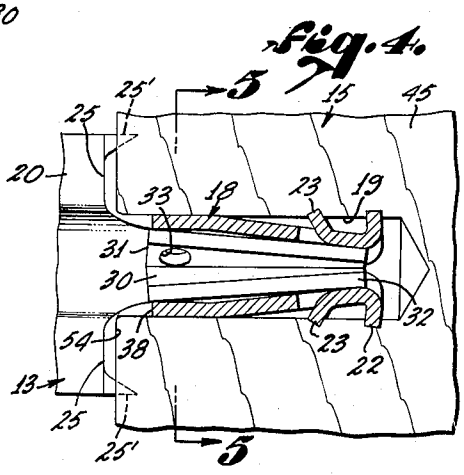


Fig. 4.



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Fig. 7.

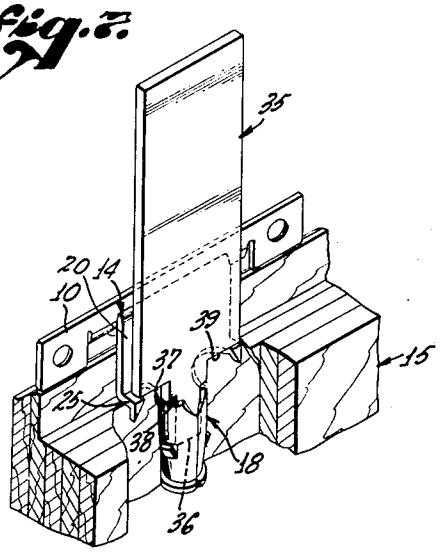
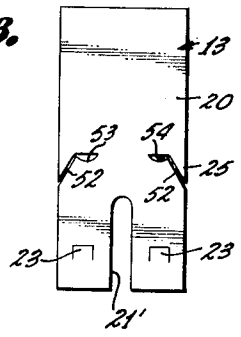


Fig. 8.



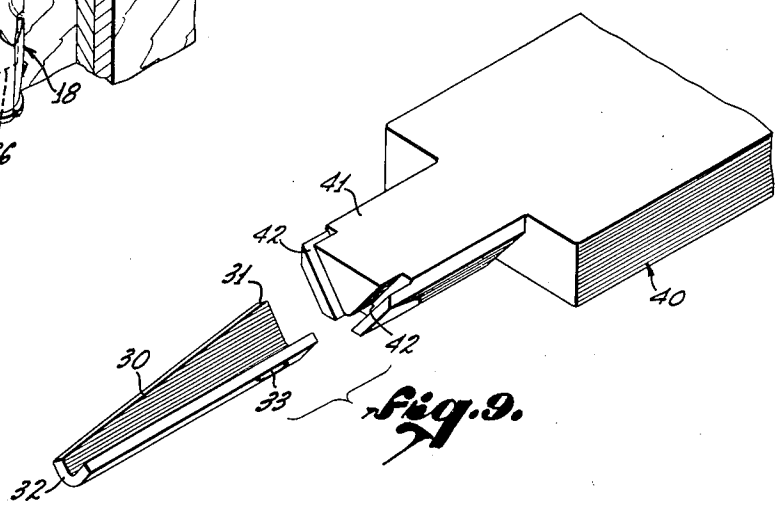


Fig. 9.

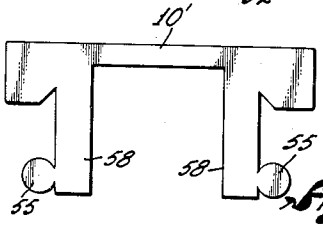


Fig. 11.

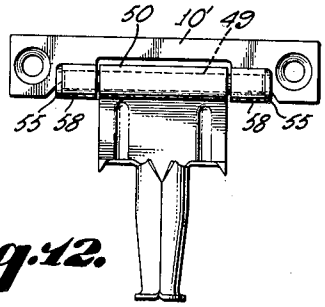


Fig. 12.

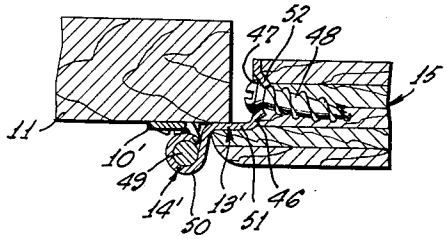


Fig. 10.

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2,735,133

HINGE

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Application January 16, 1950, Serial No. 138,856

3 Claims. (Cl. 16—128)

The application refers to hinges and has reference particularly to a hinge frequently designated as a strap hinge and which is one found particularly acceptable in the construction of cabinets where heretofore offset type hinges have been very largely used.

The art of cabinet making has been one usually requiring skillful workmanship of artisans adept in the use of tools. Successful cabinet work requires the precise fitting of parts in order not only that the parts may be well put together but also to the end that the cabinet work will present a finished appearance whether painted to give it an acceptable finish or whether stained and polished under conditions where fine wood paneling becomes the material desired.

In cabinet making the hanging of doors requires special skill in order not only to preserve a solidity of construction and neatness of appearance but also to the end that this portion of the cabinet work may be done sufficiently rapidly so that the work may be engaged in profitably. When doors are hung the hinges must be applied with special care so that once set the doors will swing properly and will not need a readjustment of the hinge attachments. Screw holes once made in the wrong place are difficult to correct. Hinges misplaced even by a small amount will mar the appearance of the cabinet work. Moreover hinges used in cabinet work particularly need be kept rather small so that they do not dominate the appearance of the work.

Having these conditions and limitations in mind it is among the objects of the invention to provide a new and improved hinge which is neat in appearance, easy to install accurately and which can be applied with far greater rapidity than hinges heretofore employed.

Another object of the invention is to provide a new and improved hinge for work in the nature of cabinet work which is so constructed that it will find its own position of proper alignment when employed in the manner prescribed.

Still another object of the invention is to provide a new and improved style of strap hinge which will accommodate itself to any type of woodwork and particularly plywood under conditions where the likelihood of splitting or damaging the wood is minimized.

Further included among the objects of the invention is to provide a strap hinge which when applied is substantially concealed, thereby preserving the continuity of the cabinet work to which it may be applied and improving the ease of painting the finished articles.

The objects include further the provision of a hinge which is simple and inexpensive to manufacture, which once installed can be readily removed for readjustment if necessary or the removal of a door from its casing, which is adaptable to doors and mill work in a great variety of sizes and weights, and which is so constructed that it will retain its grip throughout expansion and contraction of the wood to which it is attached as moisture conditions vary throughout the life of the cabinet work.

With these and other objects in view, the invention

consists in the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a front elevational view partly in section showing the hinge in a position mounting a door upon a frame.

Figure 2 is a horizontal sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a fragmentary horizontal sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a fragmentary vertical sectional view taken on the line 4—4 of Figure 2.

Figure 5 is a cross-sectional view taken on the line 5—5 of Figure 4.

Figure 6 is an exploded view showing the manner of application of the hinge to a plywood panel.

Figure 7 is a condensed view showing a subsequent position of the parts in the step following Figure 6.

Figure 8 is a plan view of a blank of material from which one strap of the hinge may be formed.

Figure 9 is an exploded view showing an expander for the hinge and a tool useful in its insertion.

Figure 10 is a cross sectional view of a modified form of the hinge.

Figure 11 is a form for a blank from which one strap of the hinge of Figure 10 is made.

Figure 12 is a view of the modified form of the device shown in section in Figure 10.

The hinge of the invention as illustrated in the drawings shows a strap or cabinet type hinge by way of example wherein only two screw holes and two screws are needed for mounting the hinge instead of customary hinges necessitating four, five or six screw holes in all and in any event screw holes for both straps of the hinge. As shown the hinge consists of a hinge strap 10 of somewhat conventional design in that it is adapted to be mounted upon a door frame 11 by means of screws 12. A second hinge strap 13 is secured to the hinge strap 10 by a pivoting joint indicated generally by the reference character 14 shown in the drawings with the axis of the swivel joint vertical so that a cabinet door 15 is adapted to swing upon a vertical axis. The swivel joint includes a hinge pin 16 on the hinge strap 10 and a hinge or sheaf 17 on the hinge strap 13.

The hinge strap 13 is specially constructed with respect to its means of attachment to the door 15 to the end that the hinge strap is provided with an expansion shield 18 adapted to be inserted into a cylindrical hole 19 in the door 15. For convenience the hole 19 may be drilled in the door at the same time dowel holes are drilled for assembling parts of the door itself. When jigs or special mounts are used as is customary in cabinet shops, the holes 19 may be located with a very high degree of precision and accuracy as well as at a great saving of time. The diameter of the hole 19 is made such that it provides a tight sliding fit around the exterior of the expansion shield 18.

The hinge strap 13 may be considered as having a flat section 20 in the embodiment selected which may be stamped as illustrated in Figure 8 prior to forming. When completed the hinge strap will have the expansion shield 18 extending edgewise from the flat section, usually in the relationship illustrated in Figures 1, 2 and 6. The expansion shield is ordinarily made generally cylindrical with longitudinal splits 21 and 21' extending in a direction transverse to the axis of the hinge connection and ordinarily as shown in a plane at right angles to the plane of the hinge strap 13. At the free end the shield is bent outwardly to form wood

gripping projections **22**. The expansion shield may also be provided with additional projections or configurations **23** which serve as another means of gripping the wall of the hole **19** so as to more effectively anchor the expansion shield in place.

To improve the strength and durability of the hinge strap **13** there may be provided one or more stiffening grooves **24** here shown extending in a general parallel relationship to the axis of the expansion shield. These grooves are primarily for the purpose of providing rigidity to the hinge strap.

There is also provided upon the hinge strap a flat offset portion comprising depth setting elements **25** which in the embodiment of Figures 1, 2 and 6 are two in number located on opposite sides of the expansion shield. These depth setting elements are in fact portions of of the hinge strap **13** bent upwardly to present flat areas or faces to the adjacent edge of the cabinet structure to which the hinge strap is to be attached. Points **25'** serve to anchor the strap in position.

With respect to forming the hinge strap **13** from a blank, attention is directed again to Figure 8 wherein the depth setting elements **25** are shown separated by cuts **52** from the body of the hinge strap and punched holes **53** are made which on one side thereof fix the location of grooves **38** and on the other side fix the location of straight edges **54** which determine not only the position of the depth setting elements **53** but also which contribute to setting the depth of the expansion shield by contact of the edges **54** with the wood at the edge of the door.

Although the expansion shield may be so sized as to fit snugly with a certain degree of frictional attachment within the hole **19**, it is found that better results are enjoyed when the shield is forcibly expanded within the hole. To expand the shield there is provided a plug or expander **30** shown in perspective view in Figure 9 and shown in assembled position in Figures 2, 4 and 5. In the embodiment selected for the purpose of illustration the expander **30** comprises a strip of metal which may be spring steel, V-shaped or angularly shaped in cross-section as is apparent in Figure 5. The expander is preferably tapered from an outside end **31** toward an inside end **32** so that it may readily enter the interior of the expansion shield and be driven into place either by use of a hammer or other convenient tool. The expander is provided with an aperture **33** to the end that once the expander has been driven into place in the position shown in Figures 2 and 4 some tool such as a hook or wire may be inserted into the aperture **32** and the expander withdrawn, thus improving the ease of removing the hinger strap and expansion shield from engagement with the door **15**.

When the hinge is to be applied to structural elements as, for example, to the door frame **12** and the door **15**, the hole **19** is first bored in its proper location so that the axis of the hole is perpendicular to the immediate edge of the door **15**. In this example the door is illustrated as a five-ply plywood door inasmuch as door panels of this type are more difficult to mount than solid panels or at least doors with solid edges.

The hinge strap **13** is applied to the door by pressing or driving the expansion shield **18** into the hole **19**. This may be done by a hammer or a hammer with the aid of a screw driver or, when operations are performed on a large scale basis, by use of a tool **35**, the tool being shown best in the exploded view of Fig. 6. For convenience the tool has a pilot **36** which fits within the interior of the expansion shield, shoulders **37** which are adapted to engage in grooves **38** on the expansion shield, and a second set of shoulders **39** which are adapted to engage the depth setting elements **25**. The distance between the outside ends of the shoulders **37** may be made no greater than the outside diameter of the expansion shield so that the shoulders **37** may enter a short distance into the hole **19** during the assembly operation. The shoulders **39** pressed upon the depth setting elements **25** may be driven in sufficiently far so that the depth setting elements are in turn driven into the wood at the edge of the door to a depth substantially equivalent to the thickness of the depth setting elements. At this point the shoulders **39** will engage the edge of the door to determine the limit to which the expansion shield is to be inserted. This depth may be kept regularly consistent by use of a tool of the character of the tool **35**. Applied in this manner the expansion shield will be in axial alignment with the hole **19** and the axis of the hinge connection between the hinge straps will be at precisely right angles thereto and precisely parallel to the edge of the door and the direction of swing of the door.

After the expansion shield has been thus positioned it may be anchored in place by insertion of the expander **30**. The expander also may be driven or pressed into place by a hammer or other convenient tool but for improved precision and speed where cabinet work is performed on a large scale an expander positioning tool **40** may be employed. The tool **40** is preferably provided with a pilot **41**, the greatest cross-sectional distance of which is not greater than the interior diameter of the expansion shield. In the pilot there may be provided grooves **42** in a V-shaped arrangement so that they are adapted to receive the end **31** of the expander **30** to a sufficient depth to guide the expander. The expander is then pressed into the expansion shield so that it occupies the position illustrated in Figures 2, 4 and 5. It is important to note that inasmuch as the split **21** is on the side of the expansion shield nearest a face **45** of the door **15**, when the shield expands it will expand in an edgewise direction. Expansion in that direction is forced by positioning the expander **30** as shown particularly in Figure 5. The reaction of the parts when thus used is such as to press the expansion shield in a direction such that it will not separate the joints of the plywood, the frictional grip being enhanced in a direction wherein the door or cabinet element has greatest strength and resistance. When the expander is made of material such as spring steel, should the condition of the wood of the door change to the end that the hole **19** becomes larger, the inherent resiliency tending to spring the expander outwardly will continue and the expansion shield will likewise continue to be pressed outwardly and thus preserve the frictional engagement. Should the hole **19** shrink, the shield and the expander may be pressed more tightly together without damaging or subsequently loosening the joint should a further change occur. It should also be noted that the depth of the hole **19** preferably exceeds the depth of the expansion shield so that should the expander be driven more deeply than necessary into the shield it will not damage, weaken or strain the plywood door panel in that extra space is provided to receive it as suggested in Figure 4.

After the hinge strap **13** has been mounted as described, the hinge strap **10** may be attached to the other cabinet element in a conventional manner.

To improve the inexpensiveness of constructing a hinge of the type described, the hinge connection may be one of the types illustrated in particular detail in Figure 3. This construction contemplates the two hinge straps **10** and **13** as comprising the only elements of the hinge. The strap **10** is punched so as to provide a space **8** and the metal of the hinge strap is turned upon itself to form the hinge pin **16**. The hinge pin, frequently designated in the form shown as a coined type hinge pin, may be perfectly rounded by being pressed between two halves of a forming die. Thereafter an end **9** of the hinge strap **13** may be projected through the spacing **8** and subsequently bent around the hinge pin to form the sheaf **17**. While this form of hinge connection is desirable from the point of view of economy and contributes to the success of the

novel features of the hinge, a conventional hinge joint may be resorted to without impairing the application of the hinge strap 13 to an appropriate cabinet element.

A modified form of the hinge is shown in Figure 10 applied to a door frame 11 in order to attach a door 15. In this form the strap 10' is constructed in a general manner as previously described, namely a conventional strap, a pin 49 provides means for mounting thereon a sheath 50 of a second strap 13'. The strap 13' has an angularly turned out or offset flat portion 46 adjoining a flat portion 51 so that the two form a right angular section fitting into the corner where the face panel overlaps the edge of the door. In the turned out portion is an inset aperture 47 tilted angularly toward the plane of the flat portion 51 at an angle of some 10° to 15°. Walls 52' of the aperture extend outward a substantial distance so that the exterior of the walls enter an obliquely drilled hole made to start a screw 48 so that the walls serve to locate the strap 13' with respect to the hole in a proper position on the edge of the door 15. The screw 48 follows an oblique path at an angle of some 10° to 15° and thus directed traverses adjacent layers of the plywood door stock.

To improve the neatness of appearance of the modified hinge and the compactness of its design the strap 10 may be provided with false ends or caps 55. The false ends may be stamped with the initial cutting of the blank as shown in Figure 11, and formed from the material comprising a pair of sheaths 58. When the strap 10' is partially completed sheaths 58 are folded over for reception of the pin 49. This pin may be smaller in diameter than is customary because of being well confined by the sheaths.

After the pin has been put in place it is confined or locked therein by the caps 55 which are bent over the ends of the pin. The caps 55 thus serve to lock the pin in place. In addition they supply a cover to prevent freshly applied paint from working into the hinge, improve the ease of painting the hinge and add measurably to the neatness of appearance of the assembled hinge.

There has therefore been shown and described a hinge having a construction particularly well adapted to precise alignment of the hinged parts which may be successfully used not only with relatively thin plywood panels but with panels or doors of virtually any description by being constructed so that one element or hinge strap can be inserted edgewise into a door. The number of sizes necessarily carried for the accommodation of doors of different thicknesses may be considerably minimized in that the hinge strap 13 may be properly positioned on a door of virtually any thickness merely by properly locating the hole 19 with respect to the faces of the door. Use of the hinge described minimizes the labor of setting and attaching the hinge by eliminating a large number of screws and holes therefor, thereby effecting a substantial saving not only in the cost of the hinge itself but in the cost of labor when using the hinge for cabinet and other work.

While we have herein shown and described our invention in what we have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of our invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

Having described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A hinge comprising two hinge straps of uniform thickness throughout engaged one within the other and having a pivotal joint therebetween, at least one of said hinge straps comprising a flat section having a laterally extending element thereon adapted to engage the edge of a door for fixing the position of the flat section with respect thereto, and a sleeve expandable laterally throughout its length extending from the flat section in a direction transverse relative to the joint and adapted to be inserted within a structural member, said sleeve having an operative position wherein the sleeve is in expanded relationship adapted to grip said structural member.

2. A hinge comprising two hinge straps of uniform thickness throughout engaged one within the other and having a pivotal joint therebetween and a straight hinge pin confined within said straps, one of said straps comprising a flat section, at least one expansion sleeve extending from the flat section in a direction transverse to the joint adapted to be inserted within a structure member, said sleeve having a longitudinal split throughout its length on one side thereof, at least one laterally extending edge portion on the flat section adjoining the shield at the end thereof adjacent the flat section adapted to engage the edge of a door to fix the position of the flat section with respect thereto, and an expander wedge having an operative position assembled in the sleeve and in outwardly pressing relationship thereto wherein the sleeve is expanded into a position adapted to grip the structural member.

3. An offset type cabinet hinge comprising two hinge straps of uniform thickness throughout engaged one within the other having a concentric pivotal joint therebetween and a straight hinge pin within said straps at the engaging portion, one of said straps having a conventional means for attachment to a structural member, the other of said straps comprising a flat section having stiffening grooves extending transversely to the joint, at least one split cylindrical expansion sleeve extending from the flat section in a direction transverse to the joint and having one side substantially in alignment with the plane of the flat section and having a split throughout the length of the other side, at least one laterally extending edge portion on the flat section adjoining the sleeve at the end thereof adjacent the flat section adapted to engage the edge of another structural member to fix the position of the flat section with respect thereto, and an expanding wedge of stiff resilient character larger in width throughout a portion thereof than the inside diameter of the shield and having an operative position assembled in the shield and in outwardly pressing relationship thereto wherein the shield is expanded to a potential gripping position for engagement with the other structural member.

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