July 25, 1967 J. G. HOLLY 3,332,711

LOCK SEAM JOINT

Filed April 22, 1964

Fig. 1

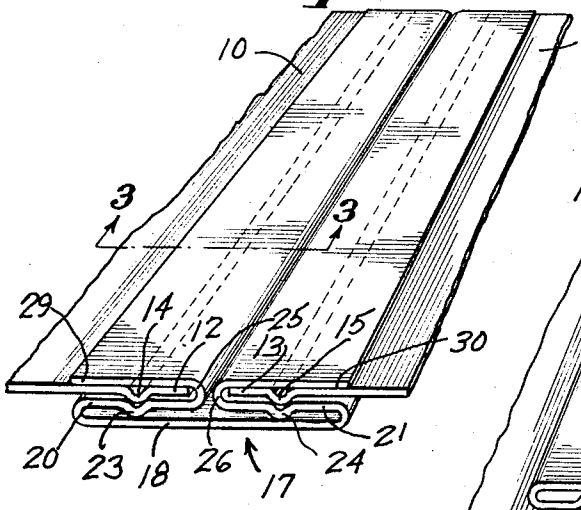


Fig. 2

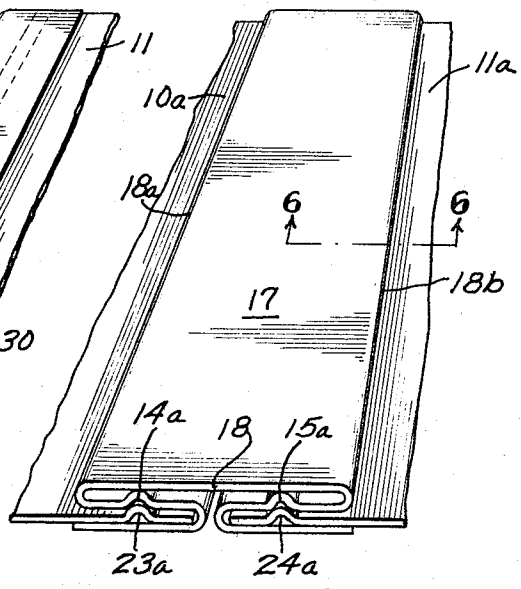


Fig. 3

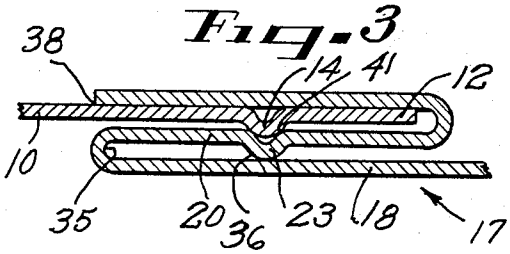


Fig. 4

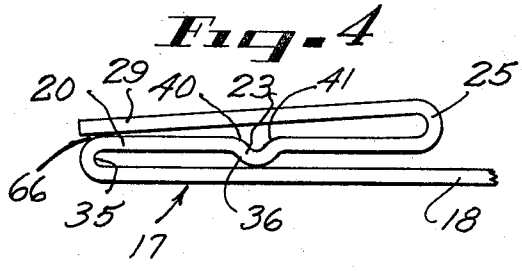


Fig. 5

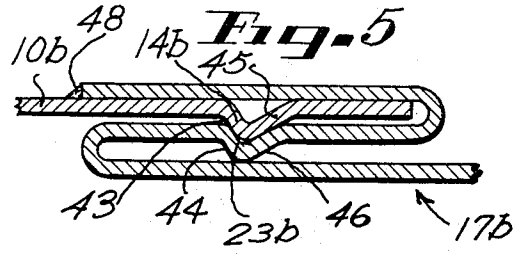


Fig. 6

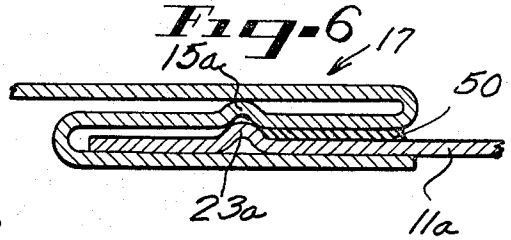
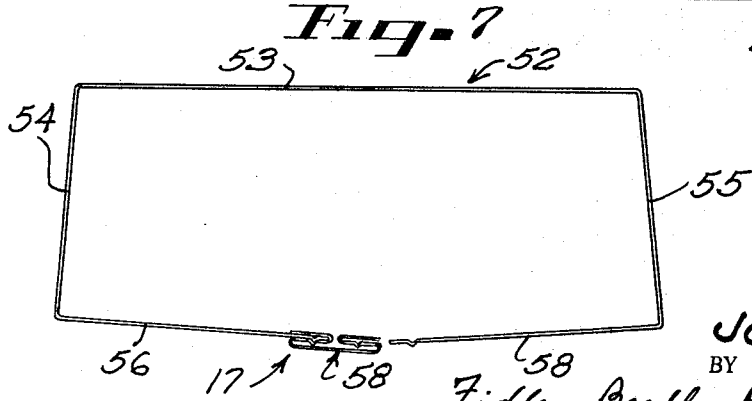


Fig. 7



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LOCK SEAM JOINT

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2 Claims. (Cl. 287—189.36)

The present invention relates to lock seam joints and more particularly to joints for securing substantially flat sheets of metal together, and still more particularly to a joint fabricated either of low or medium carbon steel, or metal having similar resilient characteristics for providing a well-sealed joint for ordinary purposes and an extraordinarily well-sealed joint when gas-tight or weather-tight seals are desired, while being economical to fabricate.

The seal is characterized in being relatively readily assembled with sheets of material that are preformed at their edges simply by rolling substantially continuous beads adjacent and parallel to the edges of the sheets of material to be joined. Most metals have the characteristic of being cold-formed readily by rolling or swedging beads therein and these metals include steel, aluminum, brass, copper, and many other different alloys and base metals.

For use with any particular metal, it is desirable to use a similar metal or a similar alloy for making the lock seam cleat portion of the invention to be described below. For example, if it is desired to copper sheath a roof with soldered joints or caulked joints, or the like, then it is preferable that a suitable resilient copper be used for making the cleat. If aluminum is to be used, a cleat of aluminum is preferred.

However, for the major use of the lock seam joint, to be described in detail below, metals of the iron and steel groups are used, such as black iron sheeting and low carbon sheets for duct work and galvanized low carbon sheets for roofing and siding, etc.

Accordingly, it is a broad object of the invention to provide an improved lock seam joint.

A further object of the invention is to provide a joint that can be made simply at the place of erection of structure made of sheet metal, and the like.

A still further object of the invention is to provide a cleat for a lock seam joint which can be assembled with sheets of metal in different convenient manners to render the use of the cleat substantially universal for joining generally flat sheets of metal.

The foregoing and other objects and advantages of the invention will be either obvious or pointed out in the following specification and claims when read in view of the accompanying drawing, in which:

FIGURE 1 is a perspective view of a cleat assembled with a pair of edges of sheet metal to form a lock seam joint;

FIG. 2 is a view of the cleat arranged on the opposite sides of the edges of metal;

FIG. 3 is a sectional view taken on line 3—3 of FIG. 1 and showing half of a cleat;

FIG. 4 is a view similar to FIG. 3, but showing the half of the cleat with the edge of the sheet metal removed therefrom;

FIG. 5 is a view similar to FIG. 3 showing a modification of the bead in the cleat and the edge of the sheet metal;

FIG. 6 is a view of an edge arranged as in FIG. 2 and including sealing compound between the cleat and the edge of the sheet metal; and,

FIG. 7 is a diagrammatic view showing one method of assembling the cleat with edges of sheet metal.

Referring now to the drawing and first to FIG. 1, a pair of sheets of metal **10** and **11** have edges **12** and **13**, respectively, in edge facing relationship to each other. Adjacent the edge **12**, there is a raised bead **14** which extends parallel to the edge. The other sheet of material **11** has a raised bead **15** adjacent the edge **13** thereof and parallel therewith.

A cleat **17** comprises a base **18** which is shown as substantially flat. However, it is to be understood (when decorative uses are desired) that the base **18** may be curved or otherwise shaped in keeping with a function of the structure of the cleat **17**. The cleat **17** may have additional utility purposes as by being formed with extensions for securing other structural parts, or the like.

Essentially, the cleat **17** provides the base **18** for spacing apart a pair of intermediate legs **20** and **21**, respectively, lying in a common plane, and which legs are bent inwardly toward the center of the base **18** and are substantially parallel therewith. At approximately the center of the intermediate legs **20** and **21** are depressed beads **23** and **24**, respectively. As will appear more fully below, the depressed beads **23** and **24** are adapted to intimately engage points of the raised beads **14** and **15** substantially along parallel lines to provide a normal seal for the device which has broad utility of itself for sealing air ducts, and the like, without any additional seal.

The inward ends of the intermediate legs **20** and **21** have return bends **25** and **26**, respectively, providing outturned legs **29** and **30**, respectively, which generally overlie the intermediate legs **20** and **21**.

The beads **14** and **15** in the sheet metal edges **10** and **11** can be very conveniently formed by known rolling or swedging equipment which will provide a longitudinal bead which is preferably continuous along and adjacent the edges **12** and **13** of the sheet metal **10** and **11**, respectively. By guiding the rolling and swedging operations along the edges **12** and **13**, the beads **14** and **15** can be rolled or swedged very accurately to provide for very small dimensional deviations between successively formed edges **12** and **13**. The cleat **17** can then be conveniently slipped onto one of the edges **12** or **13** longitudinally, or it can be slipped onto both at the same time with the sheets **10** and **11** properly placed. There is still a third method of assembly of this joint which will be described below in connection with FIG. 7 for assembling rather thin cross-sectional ducts, or the like, which can be a factory operation or one conveniently performed at the point of erection of a structure made of sheet metal.

FIG. 2 shows the cleat **11** having the base **18** on the top of sheets of material **10***a* and **11***a*. The sheets **10***a* and **11***a* can be beaded adjacent their edges to form beads **14***a* and **15***a* in the same manner as described above in connection with FIG. 1. It is to be noted with such arrangement, with the cleat **17** having the base **18** exposed or outwardly arranged with respect to the sheets **10***a* and **11***a*, that their only points of exposure are edges **18***a* and **18***b* of the base **18**, whereas in FIGURE 1 there are three lines of exposure including the edges of the outwardly extending legs **29** and **30** and return bends **25** and **26**. As will be pointed out below, such external arrangement may be desired for decorative purposes or for weather sealing of the assembly of the lock seam joint.

Referring now to FIG. 3, half of a cleat is shown and like parts bear the same reference characters as in FIG. 1. It is to be noted that the base **18** is suitably spaced at a return bend **35** to provide for substantially horizontal disposition of the intermediate leg **20** while providing clearance for the bottom surface **36** of the depressed bead **23**. The upper leg **29** is shown as intimately engaging the surface of sheet metal **10** at the point **38**. If it is desired that the formed structure of the lock seam joint be absolutely tight, it is convenient to apply solder or suitable sealant at the point **38**. The minimum amount of solder

will be required to provide sealing of the lock seam joint. It is to be understood that the opposite leg **30** can be then treated likewise as with solder or other suitable sealant to form an inexpensive hermetic seal. It is also to be noted that the raised bead **14** at points **40** and **41** contacts the upper surface of the depressed bead **23**.

Referring now to FIG. 4, the half of the cleat **17** described in connection with FIG. 3 is shown in its unassembled form without the sheet **10** in position. It is to be noted that the outer leg **29** is formed to closely approach the intermediate leg **20** adjacent the outermost points thereof. As mentioned above, it is preferred that the metal comprising the cleat **17** be resilient, that is, have a spring constant urging it toward the position shown in FIG. 4. With such resilience, with the cleat **17** assembled with an edge of the sheet metal **10**, the beads **14** and **23** will maintain intimate contact at points **40** and **41**. For most purposes, this joint is sufficient to prevent appreciable leakage such as might create noise or uneconomical operation of a system wherein heated or chilled air is circulated in ducts.

Referring now to FIG. 5, a sheet of material **10***b*, as shown, is provided with a V-notch bead **14***b* which cooperates on its lower surfaces with the inside of a depressed similar V-notch **23***b*. In all other respects, the parts of the cleat **17***b* are identical to parts of the cleat **17** described above. The legs of the V-notches **14***b* and **23***b* need not be identical in angular relationship with the center of the V, but the left-hand legs of the notches **14***b* and **23***b* may be at a substantially steeper angle than the right-hand legs **45** and **46**, whereby the force to assemble the sheet **10***b* with the cleat **17***b* will be substantially less than the force required to disassemble same to thereby lock the seam in assembled position. Solder **48** is also indicated in this figure for providing a hermetic seal of the assembled parts.

Referring now to FIG. 6, an edge of a sheet of material such as the right-hand edge **11***a* as shown in FIG. 2, is illustrated with the cleat **17** secured by means of beads **15***a* and **23***a*. A caulking compound **50**, which may be a suitable plastic or a hardening cement, or the like, is used and this structure is preferred when the lock joint is to be used for roofing. Referring again to FIG. 2, it is to be noted that the high strength base **18** of the cleat **17** is disposed upwardly and is outwardly spaced to provide beam strength for the assembly. For such structure, it may be found desirable to have longitudinal reinforcing corrugations (not shown) included in the base **18** to further augment strength in such strips. With such structure, including that shown in FIG. 2, support joists may be disposed at greater distances than would be the case without the additional strength of the cleat **17**. For such use as a beam or strut, it is preferred that the cleat be made of relatively heavy gauge material having strength attributes and be less resilient while still providing for the sealing and mechanical locking functions between the beads **15***a* and **24***a*, and **14***a* and **23***a*.

Referring now to FIG. 7, an assembly method for light gauge metal is readily effected in the following manner: A rectangular duct **52** has a flexible top and side surfaces **53**, **54** and **55**, and flexible bottom surfaces **56** and **57** which may be preformed with an opening adjacent the bottom center position **58**. The bottom sheets **56** and **57** can be stressed to bend into substantially the position shown, and the cleat **17** slipped to the left as viewed in FIG. 7 over the beaded edge of the bottom panel **56**. Referring to FIG. 4, the edge may be slipped into the entrant notch **60** between the return bend **35** and the extreme end of the overlying leg **29**. A slight force may be used to urge the cleat **17** to such an extent that the beads on the edge of the sheet **56** and in the cleat **17** snap together. In this case, it is preferred that the beads be formed substantially as described in connection with FIG. 5 with the legs of the beads **43** and **44** steeper than the legs **45** and **46** so that the resilient outer leg, such as **29** in FIG. 4, can move away readily under the camming action of the V-leg **45**, FIG. 5, while same will snap together when the beads register with each other. The right side beaded edge of the panel **57** can thereafter be slipped into the entrance notch **60** on the right side of the cleat **17** until the beads snap into place to effect a locked seam joint with a good air seal provided by spring tensioning.

The above cleat and assembled lock seam joint have been described primarily in connection with making longitudinal joints. It is to be understood that transverse joints can also be made in an elongated duct to accommodate ordinary lengths of sheet stock such as used in the trade for fabricating such ducts. In the event the locking feature is desired, it is preferred that the V-type notch, such as described in FIG. 5, be used for transverse joint connections.

While I have shown and described in detail specific embodiments of the invention, obviously modifications thereof will occur to those skilled in the art. Accordingly, I do not wish to be limited in my invention to the details shown and described, but only by the scope of the following claims.

I claim:

1. A lock seam joint comprising a pair of elongated sheets mechanically locked to a cleat, each sheet having an elongated edge having a substantially continuous raised portion extending in parallel spaced relationship with respect to the sheet edge, said cleat being formed from an elongated sheet of resilient material into a generally flat base leg portion, a first pair of intermediate legs extending laterally from said flat base leg portion and being rolled and bent back and under the flat base leg portion into generally parallel relationship with respect to each other with the innermost ends of the respective intermediate legs being spaced apart and with the respective intermediate legs being disposed in planes generally parallel to that of the flat base leg portion, a second pair of intermediate legs extending in opposite directions from the inner spaced apart ends of said first pair of intermediate legs and being rolled and bent back and under each of the respective intermediate legs of the first pair forming a connecting U-shaped portion between the first and second pairs of intermediate legs with the outermost ends of said second pair of intermediate legs being disposed in closer relationship to the first pair of intermediate legs than the innermost ends thereof, the bent back portions of the second pair of intermediate legs being generally aligned with and overlying said first pair of intermediate legs, one pair of said intermediate legs being provided with an elongated raised portion spaced between the ends thereof and in substantially parallel relationship with respect to the raised portion of the other leg, the raised portions of the intermediate legs complementing the elongated raised portions on said sheets, each intermediate leg raised portion cooperating with a raised portion on one of said sheets to mechanically lock the sheet to the cleat, each pair of intermediate legs being urged away from each other upon insertion therein of said sheet edges and said raised sheet portions and establishing the releasable compressive mechanical engagement of said intermediate leg raised portions with said sheet raised portions for frictionally and mechanically locking the sheets to the cleat.

2. A lock seam joint comprising an elongated sheet of material being formed into a generally flat base leg portion, a pair of intermediate legs extending laterally from said base leg portion being rolled and bent back and under the flat base leg portion into a generally common plane with respect to each other with the innermost ends of the respective intermediate legs being spaced apart and with the respective intermediate legs being disposed in planes generally parallel to that of the flat base leg portion, each of said intermediate legs being provided with an elongated raised portion spaced between the ends thereof with the raised portion of one leg being disposed in

substantially parallel relationship with respect to the raised portion of the other leg, the raised portions of the intermediate legs being adapted to complement elongated raised portions on sheet material, each intermediate leg raised portion being adapted to cooperate with a raised portion on sheet material to mechanically lock the sheet material to the cleat, a pair of outer legs extending in opposite directions from the inner spaced apart legs of said intermediate legs and being rolled and bent back and under with the outermost ends thereof in closer relationship to the intermediate legs than the innermost ends thereof, each respective intermediate leg forming a connecting U-shaped portion between each intermediate and outer leg, the bent back portions of the outer legs being generally aligned with and overlying said intermediate legs and the raised portions carried thereby, a pair of sheets, each having elongated edges, each of the sheets having substantially continuous raised portions disposed in generally parallel spaced relationship with respect to the edges, the sheet edges being inserted between opposed pairs of intermediate and outer legs, each pair of said outer and intermediate legs being urged away from each other upon insertion therein of the sheet edges carrying raised portions and establishing the releasable mechanical engagement of the sheet raised portions with leg raised portions for mechanically locking the sheets to the cleat.

References Cited

UNITED STATES PATENTS

933,611	9/1909	Zimmerschied	189—36
1,844,961	2/1932	Kramer	189—36 X
2,363,358	11/1944	Punte	189—36 X

FOREIGN PATENTS

912,610	12/1962	Great Britain.

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