Feb. 14, 1967 E. F. HAMILTON ETAL 3,304,108

TUBE CONSTRUCTION

Filed Dec. 18, 1963

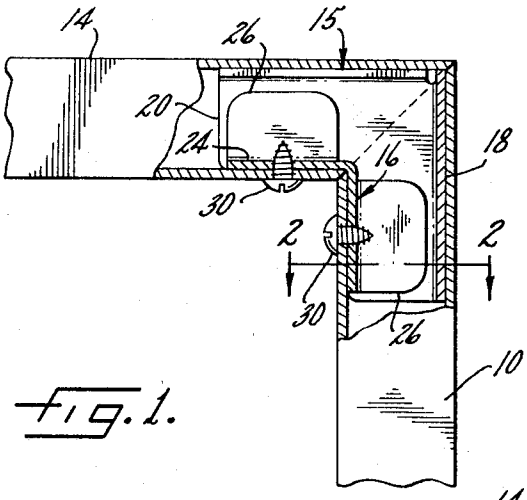


Fig. 1.

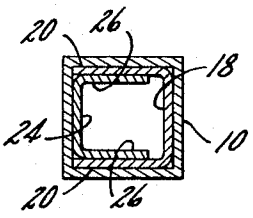


Fig. 2.

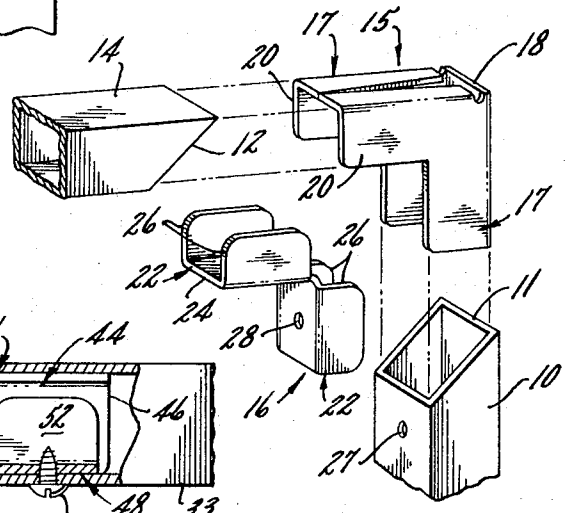


Fig. 3.

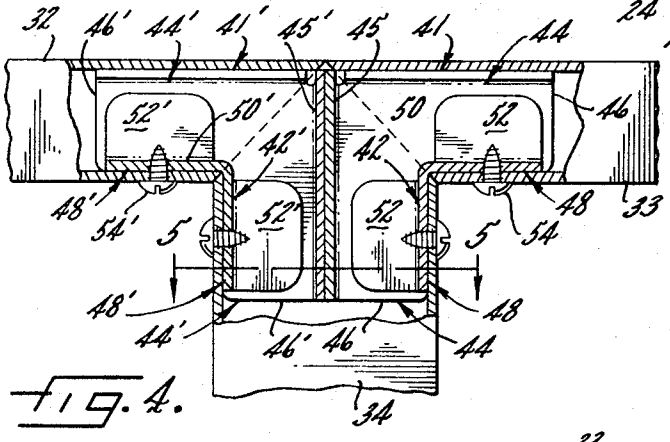


Fig. 4.

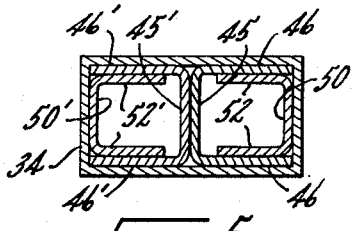


Fig. 5.

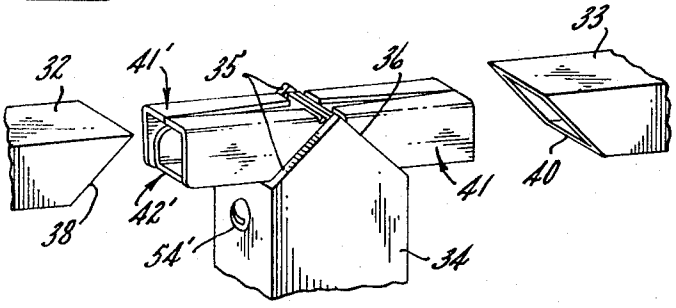


Fig. 6.

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TUBE CONSTRUCTION

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1 Claim. (Cl. 287—189.36)

This invention relates to a tube construction, and more particularly to a construction for forming an interconnection between a plurality of tubes.

It is an object of the invention to provide a construction for interconnecting a plurality of tubes which will provide a rigid interconnection between said tubes, and which will not detract from the appearance of the tubes. It is a further object of the invention to provide connectors for such tube construction which can be economically manufactured as sheet-metal stampings, and which can be easily and quickly mounted in said tubes to form a rigid interconnection therebetween.

According to one form of the invention, there is provided a first tube having a beveled end which is connected in end to end relationship with a second tube disposed at an angle thereto. The edges on the beveled end of the first tube and on the adjacent end of said second tube abut each other substantially continuously around the peripheries of the tube ends. The pair of tubes are rigidly interconnected in their angular disposition by a pair of bifurcated brackets. The first of said brackets has a pair of arms angularly oriented with respect to each other at the same angle as said tubes and received in the adjacent ends of said tubes. The second of said pair of brackets also has a pair of arms angularly oriented with respect to each other at the same angle as said tubes. The arms of said second bracket are interfit in the arms of said first bracket and are also received in the adjacent ends of said tubes. The arms on said brackets bindingly engage the inner walls of the pair of tubes for rigidly retaining said tubes angularly interconnected in end to end engagement. Preferably, fastening means extend through each of the pair of tubes for interconnecting said tubes to at least one of said pair of brackets.

Other objects and features of the invention will become apparent from the more detailed description which follows and from the accompanying drawings, in which:

FIG. 1 is a section through a tube construction embodying the invention;

FIG. 2 is a transverse section taken on the line 2—2 of FIG. 1;

FIG. 3 is an exploded isometric view of the tube construction shown in FIG. 1;

FIG. 4 is a section through a modified form of the tube construction showing the interconnection between three tubes;

FIG. 5 is a transverse section taken on the line 5—5 of FIG. 4; and

FIG. 6 is an exploded isometric view of the ends of the tubes shown in FIG. 4.

This invention is concerned with a tube construction for forming an end to end interconnection between a pair of tubes or between three tubes. Consequently, it finds application in the construction of the frames for shelving, chairs, paneling, etc.

In the embodiment shown in FIG. 1, a pair of tubes are interconnected in an angular end to end disposition. As shown, one end of a tube **10** is beveled with its beveled edges **11** disposed in abutting relationship with the correspondingly beveled edges **12** on the end of a second tube **14**. The edges **11** and **12** are disposed in substantially continuous abutting relationship around their peripheries.

The tubes **10** and **14** are rigidly interconnected by a pair of bifurcated brackets **15** and **16** conveniently formed as

sheet-metal stampings and mounted in the adjacent ends of said tubes. The bracket **15** comprises a pair of angulated channeled arms **17** each formed from a web **18** interconnecting a pair of fingers **20**. The lateral spacing between and the height of the fingers **20** are slightly greater than the internal diameter of the tubes **10** and **14** to thus permit the arms **17** to be inserted into the adjacent ends of said tubes in a press-fit. The angle between the webs **18** on the arms **17** is equal to the angle of interconnection between the tubes **10** and **14**. As shown in FIG. 1, the connector **15** is inserted into the adjacent ends of the tubes **10** and **14** and bindingly abuts the inner walls of said tubes along the outside of the angle of interconnection between said tubes for assuring a matched mitred corner at the tube joint.

The bracket **16** also comprises a pair of angulated channeled arms **22** each formed from a web **24** interconnecting a pair of fingers **26**. The angle between the webs **24** is also equal to the angle of interconnection between the tubes **10** and **14**. The bracket arms **22** are insertable in the adjacent ends of the tubes **10** and **14** with their webs **24** abutting sections of the inner tube walls along the inside of the angle of interconnection between the tubes, said sections being diametrically opposed to the wall sections abutting the webs **18** on the bracket **15**. Conveniently, openings **27** and **28** are formed in the tubes **10** and **14** and in the webs **24** for the reception of screws **30** to rigidly interconnect the bracket to the tubes **10** and **14** for interconnecting said tubes to each other.

In forming the connection shown in FIG. 1, the bracket **16** is interfit in the bracket **15** with its fingers **26** bindingly engaging the fingers **20** in face to face contact. With the brackets thus interfit, one set of their arms **17** and **22** is inserted into the tube **10**, with the other set of their respective arms **17** and **22** angling outwardly from the end of said tube. The adjacent end of the tube **14** is then forced over the outwardly projecting arms **17** and **22** until the beveled tube edges **11** and **12** are disposed in abutting engagement with each other. In such position, the openings **28** will be disposed in alignment with the openings **27** for insertion of the screws **30** for retaining the tubes in their interconnected relationship, and said tubes will be further retained in interconnected relationship by the arms **17** and **22** being press-fit in their adjacent ends.

In the embodiment in FIGS. 4–6 a pair of tubes **32** and **33** are interconnected to each other and to a third tube **34** of larger cross-section than the tubes **32** and **33**. As shown, the tube **34** has two sets of beveled edges **35** and **36** which lie in different angularly oriented planes. The edges **35** are adapted to abut the beveled edges **38** on the adjacent end of the tube **32**, and the beveled edges **36** are adapted to abut the beveled edges **40** on the adjacent end of the tube **33**. The several tubes are interconnected to each other with their adjacent edges in abutting relationship by two pairs of opposed bifurcated brackets, the brackets in each pair being identical to the pair of brackets shown in FIGS. 1–3.

As shown in FIG. 4, the tube **33** is interconnected to the tube **34** by brackets **41** and **42**. The bracket **41** comprises a pair of channeled arms **44** angularly oriented with respect to each other at the same angle as the angle of interconnection between the tubes **33** and **34**, and each formed from a web **45** interconnecting a pair of fingers **46**. The lateral spacing between and the height of the fingers **46** are slightly greater than the inner diameter of the tube **33** to permit one of the arms **44** to be inserted in said tube in a press-fit.

The bracket **42** also comprises a pair of channeled arms **48** at the same angle as the angle of interconnection between the tubes **33** and **34**, and each formed from a web **50** interconnecting a pair of fingers **52**. The arms **48** are insertable in the adjacent ends of the tubes **33** and **34** with

their webs abutting sections of the inner tube walls along the inside of the angle of interconnection between said tubes. Conveniently, openings are formed in the tubes **33** and **34** for the reception of screws **54** rigidly interconnecting said tubes to the bracket **42**.

The tubes **32** and **34** are interconnected by a pair of brackets **41'** and **42'** identical in construction to the brackets **41** and **42**. The bracket **41'** comprises a pair of arms **44'** at the same angle as the angle of interconnection between the tubes **32** and **34**, and each formed from a web **45'** interconnecting a pair of fingers **46'**. The bracket **42'** comprises a pair of arms **48'** at the same angle as the arms **44'**, and each formed from a web **50'** interconnecting a pair of fingers **52'**. Openings are formed in the tubes **32** and **34** for the reception of screws **54'** rigidly interconnecting said tubes with the bracket **42'**.

In assemblying the tube construction shown in FIG. 4, the brackets **42** and **42'** are interfit in the brackets **44** and **44'**, respectively. The spacing between the several bracket fingers is such that the fingers **52** and **52'** will bindingly engage the fingers **44** and **44'** to bindingly retain the brackets in each pair in a rigid press-fit. Each pair of the brackets is then inserted into the tube **34** with their adjacent webs **45** and **45'** disposed in opposed back to back relationship. With the brackets inserted into the tube **34**, one pair of arms on each pair of brackets will project angularly outwardly from the open end of said tube. The tube **33** can then be inserted over the outwardly projecting pair of arms **44** and **48**, and the tube **32** can be inserted over the outwardly projecting pair of arms **44'** and **48'**. The tubes **32** and **33** are forced onto their respective pairs of bracket arms until their adjacent ends are disposed in abutting relationship and their edges **38** and **40** abut the edges **35** and **36** of the tube **34**. The screws **54** and **54'** are then inserted into the several tubes and the bracket webs **50** and **50'** for rigidly retaining said tubes in their interconnected relationship.

In each of the embodiments, the tubes have been shown to have an angle of interconnection of 90°. It is to be understood, of course, that the invention contemplates interconnecting two or three tubes at any desired angle of interconnection. Therefore, it is not necessary in all circumstances to bevel the end of each of the interconnected tubes. It is to be further understood that, although the

tubes have been shown as having rectangular cross-sections, said tubes may have any desired cross-sectional contours. It is desired, however, that the cross-sectional configuration of the webs and fingers on the brackets correspond to the contours of the inner walls of said tubes to provide a binding face to face contact between the brackets and tubes.

We claim:

A tube construction, comprising a first tube having a beveled end, a second tube at an angle to said first tube, the edges on the beveled end on said first tube and the adjacent end of said second tube abutting each other substantially continuously around the peripheries of said ends, a first bifurcated channeled bracket having a pair of arms angularly oriented with respect to each other at the same angle as said tubes and received in said tubes, a second bifurcated channeled bracket having a pair of arms angularly oriented with respect to each other at the same angle as said tubes and interfit the arms of said first bracket and received in said tubes, each of the arms on said first and second brackets comprising a web interconnecting a pair of fingers, the webs on said brackets abutting diametrically opposed sections of the inner wall of each of said tubes, the fingers on said second bracket abutting the fingers on said first bracket in face to face relationship, and the arms on said brackets bindingly engaging the inner walls of said tubes for rigidly retaining said tubes in interconnected end to end relationship.

References Cited by the Examiner

UNITED STATES PATENTS

1,765,388	6/1930	Watson	189—76
2,188,209	1/1940	Sharp	189—36
2,279,171	4/1942	Lowry	189—36 X
2,792,918	5/1957	Olsen	189—36

FOREIGN PATENTS

201,740	5/1956	Australia.
85,088	5/1957	Netherlands.

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