Sept. 19, 1939. I. G. EKLUND 2,173,516

AUTOMOBILE FRAME

Filed Aug. 26, 1936 2 Sheets-Sheet 1

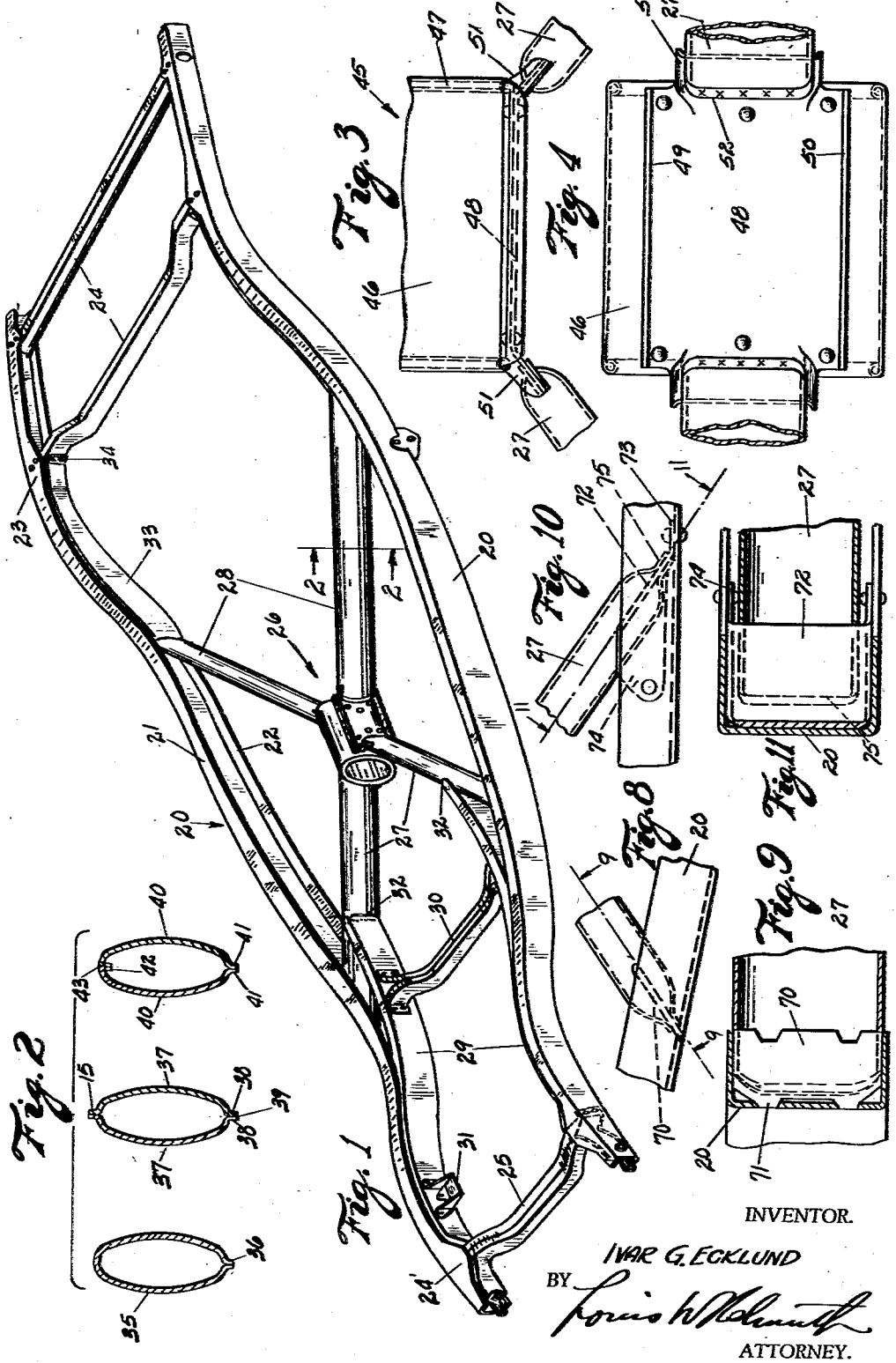


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 10

Fig. 11

Fig. 8

Fig. 9

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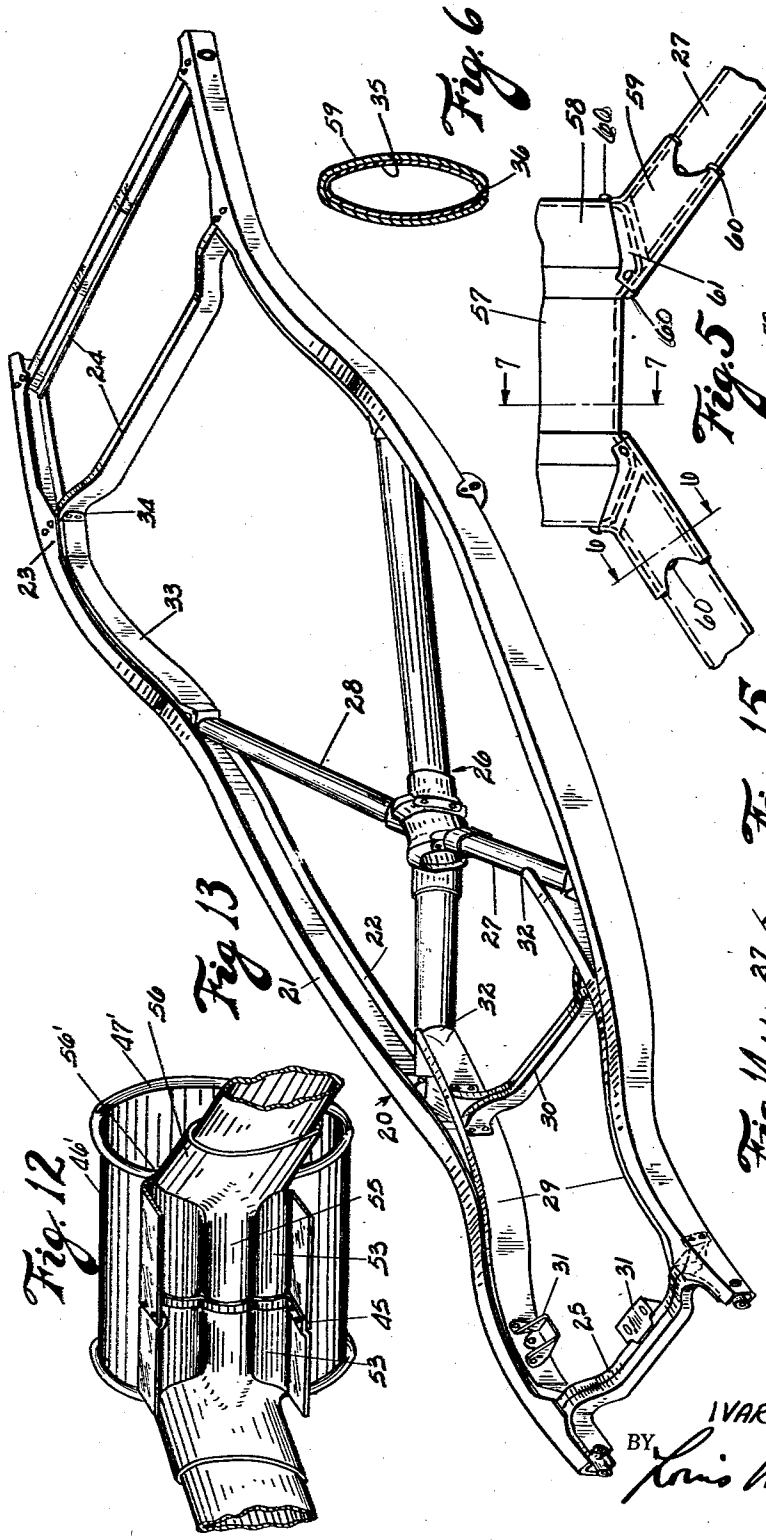


Fig. 6

Fig. 5

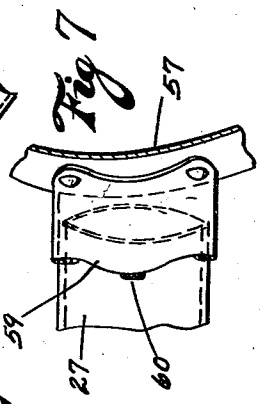


Fig. 7

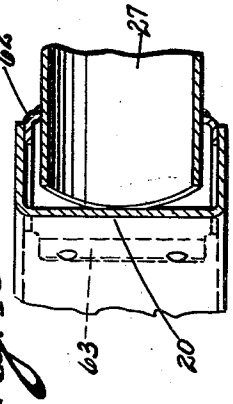


Fig. 15

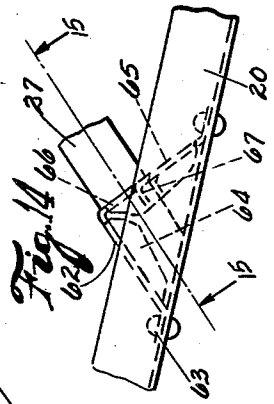


Fig. 14

Fig. 12

Fig. 13

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2,173,516

UNITED STATES PATENT OFFICE

2,173,516

AUTOMOBILE FRAME

Ivar G. Eklund, Detroit, Mich., assignor to The Midland Steel Products Company, Cleveland, Ohio, a corporation of Ohio

Application August 26, 1936, Serial No. 97,982

14 Claims. (Cl. 280—106)

This invention relates to new and useful improvements in automobile chassis frames and an important object of the invention is to provide improved construction for the X-shaped cross member joining the mid-section of the side rails.

Another important object of the invention is to provide simple and inexpensive construction for economically connecting the ends of the arms of the X-member to the side bars of the frame.

A still further object of the invention is to provide an improved form of intersection for the arms of the X-member.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the accompanying drawings forming a part of the application and wherein like numerals are employed to designate like parts throughout the several views.

Fig. 1 is a perspective view of the improved automobile frame,

Fig. 2 are modified forms of cross section for the arms of the X-member taken on the line 2—2 of Fig. 1,

Fig. 3 is a fragmentary top plan of one form of improved intersection for the X-member,

Fig. 4 is a side elevation of the same,

Fig. 5 is a modified form of intersection,

Fig. 6 is a transverse section of the same taken on the line 6—6 of Fig. 5,

Fig. 7 is a fragmentary section taken on the line 7—7 of Fig. 5,

Fig. 8 is an enlarged top plan of a form of connection between the arms of the X-member and the side bars,

Fig. 9 is a section of the same taken along the lines 9—9 of Fig. 8,

Fig. 10 is a top plan of a modified form of joint between the X-member arms and side bars,

Fig. 11 is a section of the same taken on the line 11—11 of Fig. 10,

Fig. 12 is another modified form of intersection for the X-member,

Fig. 13 is a perspective view of a frame embodying the X-member form shown in Figs. 5, 6 and 7,

Fig. 14 is a top plan of another form of joint between the arms of the X-member and the side bars,

Fig. 15 is a section of the same taken on the line 15—15 of Fig. 14.

In my co-pending application Serial No. 83,719 there is illustrated an automobile frame having several of its component parts formed of substantially elliptic or seed-like cross section with the major axis vertical, such application showing several forms of connection between the arms of the X-member and tubular side bars or rails. In the present application is shown several means for connecting these elliptic section arms of the X-member to the more or less customary U-shaped inwardly facing channel side rails. Such side rails are designated by the numeral 20 having inwardly facing flanges, the upper ones being designated by the numeral 21 and the lower flanges by the numerals 22. Each of the side rails is provided with an offset or kickup portion at its front and rear and the mid-sections of the two rails are bowed outwardly as clearly seen in Fig. 1 to provide for the attachment of a larger and roomier body for the automobile. The flanges of each side rail adjacent their rear ends are provided with inwardly extending extensions 23 for the attachment of a pair of spaced transverse cross members 24 which may be of any desired cross section tubular or the channel form illustrated in the drawings.

These two side rails are also connected at their forward ends by means of a transverse front cross member 25; extensions 24' of the flanges of the rails, similar to the extensions 23 being provided for the connection and welding of this front cross member to the side bars.

An X-shaped cross member is indicated by the numeral 26 and has its two forwardly diverging arms 27 and its rearwardly diverging arms 28 connected to the two side rails at points beyond the mid-section of the side bars as clearly illustrated. In order to form the two side rails between the X-member and the front and rear cross members 24 and 25, into tubular or box-shaped cross section, inner channel-shaped supplemental rails 29 and 33 are provided. Each supplemental rail 29 has its channel facing opposite to the channel of the forward portions of the side bars 20 and nested therein to form the side rail into box-shaped cross section. The flanges of these supplemental rails may be welded or riveted to corresponding flanges of the side bars all the way from the front cross member 25 to a point just in advance of the forward arms 27 of the X-shaped member. From this point on back, the sub-rails are continued substantially in a straight line, nevertheless leave the side rail due to the side rails beginning to bow outwardly at this point and are there connected by a transverse cross member 30 which also forms a rear motor support. Forward motor supporting brackets 31 may be provided at any suitable places to take care of the support of the front end of the motor. The rearmost ends of the

sub-rails 29 where they meet the forward arms of the X-member are flanged or flared as at 32 and conform to the shape of the arms 27 to be welded or otherwise secured at these points.

The channel side rails between the rear arms 28 of the X-member and the foremost of the two rear cross members 24 are similarly treated and formed into closed box-shape cross section by means of channel-shaped sub-rails 33 which have their flanges facing in opposition to the flanges of the side rails to be welded or otherwise suitably fastened thereto. The rear end of each sub-rail 33 is flanged inwardly toward the center of the frame as at 34 to be secured to the foremost of the two rear cross members 44. Thus, the channel side rails fore and aft of the X-shaped cross member are of closed box section and particularly over the front and rear kickups of the side rails.

The four arms of the X-member are of elliptic or seed-like cross section shown in Figs. 2 and 6 and are arranged in the frame, with their major axes vertical. These arms of the X-member may be formed in several different ways shown in Fig. 2, the first view of Fig. 2 representing an arm 35 formed from a single blank of material bent into seed-like cross section with the two longitudinal margins juxtaposed and welded or riveted together as at 36. The second view of Fig. 2 shows this section formed from two separate outwardly convexed stampings 37, each having outwardly extending marginal flanges 38 which are juxtaposed and welded or riveted together as at 39. The third and last view of this figure shows the X-member arm as being formed of two separate outwardly convexed stampings 40, each having one margin with an outwardly extending flange 41 and its other margin terminating in its inwardly extending flange 42. Corresponding flanges of each stamping are juxtaposed and welded or riveted together. It is obvious that the flanges 41 may also be formed inwardly to be ultimately disposed inside of the hollow section so that the two stampings can be welded together by laying the welds 43 in the slight crevice between these two parts to fill the same and render its contour perfectly smooth.

Several different forms of intersections for uniting the four arms of the X-member have been disclosed and attention is first called to the form shown in Figs. 3 and 4. Here, the intersection is composed of a substantially oval tubular member 46 with its major axis arranged vertically when the member is associated in the frame. This member 46 may be formed from one piece with one longitudinal seam weld, or may be formed of two separate stampings joined with a pair of longitudinal welds disposed either in the vertical or horizontal plane.

In order to render this member 46 as strong as possible with minimum material, the ends 47 are beaded or rolled either inwardly or outwardly. In order to join the arms of the X-member to this intersection, a substantially channel-shaped plate 48 is secured to each vertical side of the oval member. The web portions of each member 48 is convexed outwardly to fit the contour of the intersection and the upper and lower flanges 49 and 50 extend outwardly of the member as illustrated. Each vertical end edge of each plate is provided with a reduced extension 51 arranged oblique with respect to the side rails. The upper and lower edges of these extensions 51 are slightly flanged to rigidify the same. These extensions 51 also fit in kerfs in the inner ends of the X-member arms, the latter having vertically extending flanges 52 to be spot or otherwise welded to opposite side faces of the extensions 51. When the arms of the X-member are formed from two separate stampings, no kerf is required in the end for attachment to extension 51, inasmuch as the two stampings constituting the X-member arm may be left separated so as to form a slot in which the extension 51 is snugly received. As in other cases, the flanges 52 are welded or otherwise suitably secured to the extensions.

In Fig. 12 is illustrated another form of intersection composed of a substantially oval shaped tubular member 46' having its end edges 47' rolled or beaded outwardly of the section to reduce its overall height. In this modification instead of providing a single plate 48 on each side of the intersection, two channel-shaped plates 53 each having overlapping ends 54 are suitably secured together and to the sides of the intersection member. Each plate 53 has its web portion conformed to the contour of the intersection 46' and provided with a longitudinally extending outwardly formed embossment 55 which widens near the end edge of the plate and is there formed into an elliptic cross section or socket 56 for receiving the inner end of its respective X-member arm. The inner side wall of each socket is formed so that it can be welded as at 56' to the bead 47' as shown. The joint between each socket and X-member arm may be formed by welding circumferentially around the end of the socket 56, as will be obvious.

The third form of intersection is shown in Figs. 5, 6, 7 and 13. Here, the intersection 57 is also oval shaped with its ends 58 enlarged laterally as shown best in Figs. 5 and 13. Socket members 59 receive the inner ends of the X-member arms to be welded thereto as at 60 and the inner ends of these sockets are flared as at 61 to fit the contour and to be welded to the enlarged ends of the intersection 57.

In Figs. 13 and 14 the outer ends of the four X-member arms are connected to the channel-shaped side rails by means of especially formed triangular brackets 62 nested in the channel of its respective side rail with its ends 63 turned outwardly and riveted or otherwise suitably secured to the web of the side rail. The two arms of the bracket are formed with upper and lower horizontal flanges 64 which closely engage the inner surfaces of the upper and lower flanges of the side rails to be riveted or welded thereto. The arm 65 of the bracket which is normal to the longitudinal line of the X-member arm which is to be united therewith is provided with an opening 66 through which the elliptic X-member arm extends, the edge of this opening having flanges as at 67 if desired. One side of the X-member arm lies against the other angular and bowed out arm of the bracket 62, and wherever this arm contacts with the bracket it may be welded or riveted to securely retain it in position. Also, if desired, the end of the X-member arm may be mitered to an angle corresponding with the side rail where it meets the same to be also welded to the web of the side rail.

Other forms of connecting the arms of the X-member with the channel-shaped side rails are shown in Figs. 8 through 11 inclusive. In Figs. 8 and 9 a flat plate 70 is welded in the channel of the side rail to fit within the kerf in the outer end of the X-member arm 27. In Fig. 9 it will be noted that this plate 70 is provided with projections 71 which extend through apertures in the web of the side rail and are welded thereto.

In Figs. 10 and 11, a similar joint is shown in which a bracket 72 is nested within the channel of the side rail and is provided with a flange 73 riveted or welded to the web of the side rail, and upper and lower flanges 74 likewise secured to the rail flanges. The vertical portion of this bracket fits within the kerfed end of the X-member arm to be straddled by the two sections thereof and is spot welded or otherwise suitably secured as at 75.

Various changes in the size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention or scope of the appended claims.

I claim:

1. An X-shaped cross member for automobile frames comprising a hollow intersection member substantially elliptic in cross section with its major axis vertical, the ends thereof being reinforced by annular ribs, and arms secured to and radiating from said member in substantially the same plane therewith.

2. An X-shaped cross member for an automobile having a propeller shaft, comprising a hollow substantially oval intersection member open at both ends for the extension of a propeller shaft therethrough, sockets carried by the ends thereof, said sockets being arranged in diagonal pairs in substantial alignment, and arms for the X-member of substantially elliptic cross section received in said sockets.

3. An X-shaped cross member for automobile frames comprising an intersection member, plates secured to opposite sides thereof and each formed at its ends with integral sockets oblique to the longitudinal center line of the frame and having edges welded to said member, and arms for the X-member having their ends fastened in said sockets.

4. An automobile frame comprising a pair of channel-shaped side rails, an X-member located at substantially the middle of the frame and having hollow arms extending to the side rails, substantially L-shaped brackets secured to the flanges of the rails in the channel thereof with the corners of said brackets extending inward toward the longitudinal center line of the frame to present one side of the bracket at an obtuse angle to the web of the rail, and the ends of the arms of the X-member being fastened to said brackets.

5. An automobile frame comprising a pair of channel-shaped side rails, an X-member located at substantially the middle of the frame and having hollow arms extending to the side rails, substantially L-shaped brackets secured to the flanges of the rails in the channels thereof with the corners of said brackets extending inward toward the longitudinal center line of the frame to present one side of each bracket at an obtuse angle to the web of the rail, and the ends of the arms of the X-member extending through said sides of the brackets and in contact with an adjacent curved side thereof for welding to the bracket.

6. An automobile frame comprising a pair of channel-shaped side rails, a cross member connecting the same, an X-shaped cross member located in spaced relation to the cross member and substantially at the mid-section of the frame and having hollow arms extending to the side rails and connected thereto, and members closing channels of the rails between the cross member and X-member and having their ends adjacent the X-member bent inwardly toward the center of the frame and formed to the contour of the tubular arms and secured thereto in spaced relationship to the side rails.

7. An X-shaped cross member for an automobile having a propeller shaft, comprising a hollow intersection member substantially oval in cross section with its major axis vertical of the automobile and its ends open to receive the propeller shaft, and hollow arms of substantially elliptic cross section with their major axes vertical secured to and radiating from said intersection member.

8. An X-shaped cross member for an automobile having a propeller shaft comprising an intersection member having both ends open to receive the propeller shaft, sockets carried by the ends thereof, said sockets being arranged in diagonal pairs in substantial alignment, and arms for the X-member of substantially elliptic cross section received in said sockets.

9. An X-shaped cross member for automobile frames comprising an intersection member, plates secured to opposite sides thereof and each formed at its ends with integral sockets oblique to the longitudinal center line of the frame, and hollow arms for the X-member having their ends fastened into said sockets.

10. An X-shaped cross member for automobile frames comprising a hollow intersection member of substantially oval cross section, channel shaped plates having their webs curved to fit said member and secured to opposite sides thereof, connecting means at opposite ends of each plate, and hollow arms having their ends connected to said means to resist torsion and shear.

11. An X-shaped cross member for automobile frames comprising a hollow intersection member of substantially oval cross section, channel shaped plates having their webs curved to fit said member and secured to opposite sides thereof, the ends of each plate terminating in an extension, and hollow arms having their inner ends slotted to receive and be connected to said extensions.

12. In an automobile frame having a pair of longitudinally extending side rails, an X-shaped cross member connecting the same and having four hollow radiating arms of seed-like cross section with opposed outwardly convexed side walls, said arms converging toward and secured to an annular member disposed at substantially the longitudinal center line of the frame, and said annular member having an opening with its axis arranged substantially lengthwise of the frame.

13. An X-shaped cross member for automobile frames comprising a substantially oval section member constituting the sole center piece of the X-member, the ends thereof being reinforced by annular ribs, and arms secured to and radiating from the oval member in substantially the same plane therewith.

14. An X-shaped member for automobile frames comprising a hollow intersection member substantially oval in cross section, the ends thereof being reinforced by annular ribs, socket members fitted over and secured to said ribs, and arranged in diagonal pairs in substantial alignment and hollow arms for the X-member secured in said socket members.

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