(No Model.)

L. M. COTTLE.

TUBULAR METAL JOINT.

No. 421,482. Patented Feb. 18, 1890.

Fig. 1

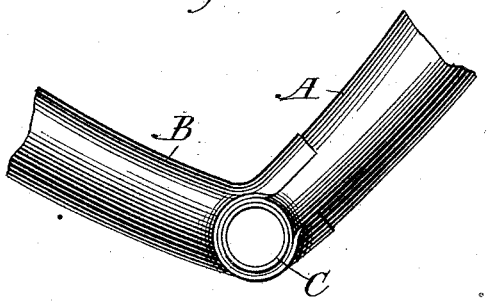


Fig. 2.

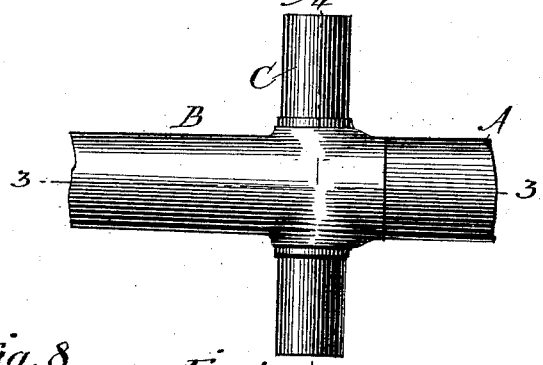


Fig. 8.

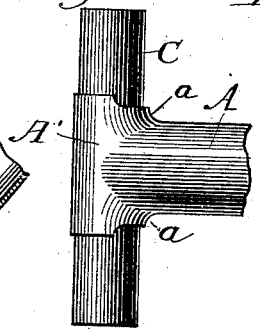


Fig. 4.

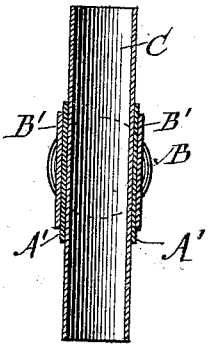


Fig. 3.

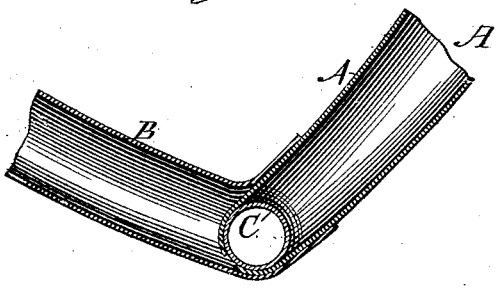


Fig. 7.

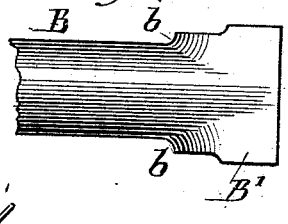


Fig. 5.

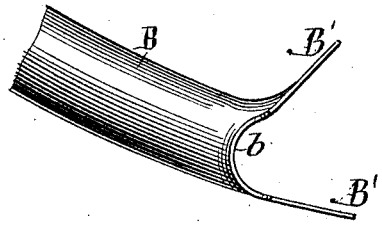
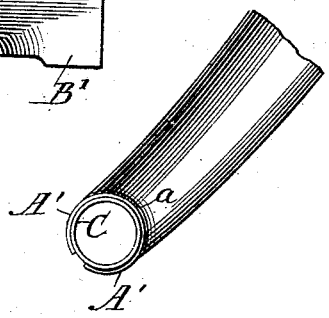


Fig. 6.



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Jean Elliott

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By Burton & Burton
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UNITED STATES PATENT OFFICE.

LUTHER M. COTTLE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THOS. B. JEFFERY AND R. PHILIP GORMULLY, OF SAME PLACE.

TUBULAR METAL JOINT.

SPECIFICATION forming part of Letters Patent No. 421,482, dated February 18, 1890.

Application filed March 6, 1889. Serial No. 302,187. (No model.)

To all whom it may concern:

Be it known that I, LUTHER M. COTTLE, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in a Tubular Metal Joint, which are set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

Figure 1 is a side elevation. Fig. 2 is a plan. Figs. 3 is a section at the line 3 3 on Fig. 2. Fig. 4 is a section at the line 4 4 on Fig. 2. Fig. 5 is a side elevation of one of the parts of the longitudinal bar in the form in which it appears before being joined to the remainder. Fig. 6 is a side elevation of the other part of the longitudinal bar and the cross-bar joined thereto. Fig. 7 is a bottom plan of the part shown in Fig. 5. Fig. 8 is a plan of the same parts shown in Fig. 6.

The joint to which this invention relates is particularly useful in velocipede-frames and other frames of like light machinery or vehicles wherein rigidity and lightness are both essential, and which are for that reason preferably made of tubular metal. The necessity for a joint of the nature specifically hereinafter described arises particularly when it becomes necessary to extend one arm or bar of such frame transversely to and entirely across another bar, so that from the intersecting point the frame branches in four directions. The difficulty of making a junction of this nature between two pieces of tubular metal without so cutting away the metal as to make the joint exceedingly weak has led to the method usually employed—viz., of forming such a joint by means of a forging having all the necessary lugs to which the four arms, or so many of them as are needed, are suitably brazed or otherwise made rigid. Such a joint is heavy and expensive to construct; and my invention removes these difficulties as well as overcomes the difficulty heretofore experienced in making the junction of tubular metal alone, and constitutes a strong, light, and workmanlike joint.

The figures represent a "cross-joint" when the cross-piece is located at an angle or bend in the longitudinal piece, and I have chosen this particular form to illustrate, because it is one of the most difficult in construction and presents the advantages of my construction most fully, because such abrupt bends as are here represented in the longitudinal pipe cannot safely be made in a continuous pipe.

A is one part of the longitudinal bar. B is the other part.

C is the cross-bar.

The part A is first curved at one end in the manner which I will now describe, and by a process which is the subject of my application, Serial No. 302,188, filed March 6, 1889, but which I shall necessarily partly describe. The part A is first split down part way from the end, and the two forks thus severed are spread and at the same time flattened laterally, the metal being stretched by suitable dies at the junction of the forks, and thereby flared outwardly at the part *a*. The forks A′ A′ constitute at this stage in the operation broad lugs or leaves, whose surfaces merge at the middle of their breadth in the surface of the part A, the metal at their ends being continuous from one to the other by means of the flared or flange-like portion *a*, produced by stretching the edge of the forks, where they were split apart, at the lower end of the slit, as described. In order to produce the proper shape at this part, it is advisable to cut away some portion of the metal at the lower end of each slit—that is, to widen the slit, so that it constitutes a hole in the pipe—thus forming a more extended edge to be stretched to form the flange *a*. These flanges constitute a seat, which will receive the cross-bar C. The lugs A′ A′, which at their lateral margins are connected by the flanges *a*, so that the surface and edge of the metal are continuous from one lug to the other, are now clasped upon the transverse bar C, and may be made long enough to completely encircle it, as illustrated, and the folding being properly done about a mandrel before the insertion of the bar B the parts may be made to fit very snugly together; or a like result may be effected when the shape of the bar B is otherwise than straight, so that it cannot be inserted after the folding of the lugs A′ is

completed, by folding such lugs directly down upon the cross-bar, which will afford sufficient resistance to permit the folding to be effected closely and so that the lugs will make close-fitting joint upon the cross-bar, so that the two parts can, if desired, be brazed together. The flanges *a* are preferably made sufficiently broad—that is, the metal is sufficiently stretched laterally or flared to form them—so that they will contact the bar B for a distance at least three times the thickness of the metal, for the purpose of making the junction at that point as strong as the metal itself, and this being done it is not essential that the lugs A′ should be long enough to fold around the cross-bar, but it is sufficient that they lap onto it; but when the lugs are longer and wrap around the cross-bar the extent of their surface, which contacts the cross-bar C, will render the junction very secure, even if the contact of the flanges *a* is less than stated.

The part B of the longitudinal bar has formed at the end two lugs B′ B′ and flanges *b* by the same process substantially as that above described for forming the lugs A′ A′ and flanges *a* of the part A. The seat formed by the flanges *b*—that is to say, the aperture between the two forks B′—is large enough to receive the lugs A′, clasped, as above described, upon the part C—that is to say, it is smaller than the similar seat made by the flanges *a* by the amount of the thickness of the lugs A′—so that the part A, either with or without having the cross-bar C clasped by its lugs A′, may be inserted between the forks B′, the cross end or head of the part A, which is formed by the lugs A′, folded in the manner described, resting as a transverse bar in the seat formed by the flanges *b*′ between the lugs B′. The lugs B′ are then clasped closely upon the part B, and they may be made long enough so that they extend beyond the cross-head formed by the lugs A′, as stated, and be lapped onto and be lodged laterally partly around the longitudinal portion of the part A. As the portion which laps the part A beyond the cross-head is folded over at the edge to conform to that part, the metal is stretched slightly in the angle between the pipe and the cross-head, but so slightly that without special appliances the lugs B′ will be easily formed by the hammer to fit the part A, and the cross-head formed by the lugs A′, and all three parts A, B, and C may be then brazed together—that is to say, the part C being brazed where it is clasped by the lugs A′, and the part B being brazed to the part A where the lugs B′ clasp the latter—thus making a compact and integral joint whereat the metal is about three times the thickness of the pipe at other parts, the joint having a breadth equal to at least half the circumference of the pipe—that is to say, since the breadth of the joint is the breadth of the lugs A′ and B′, and those lugs are formed by splitting the pipe and unfolding it, even if in that process the lugs were not stretched laterally, the breadth of the joint would be half the circumference of the pipe; and this joint, being tubular transversely to the longitudinal extent of the parts A and B, will have very great power of resistance to torsional strain about the axis of the longitudinal bar A B. Such a joint may be formed even when the cross-bar C is not to be employed as a cross-bar—that is, the length of the bar being limited to the length of the lugs A′ and B′, and being employed simply for the additional strength and rigidity which it gives to the joint.

In the description of this joint thus far I have not specified the difference in direction between the two parts A and B of the longitudinal bar, whereby the bend in that longitudinal bar is effected at the joint described. This bend is made at the time of forming the flanges *b* and spreading the lugs B′, the lugs, after being partly flattened, being readily bent as any flattened strip might be and made to project in the direction which the part A is made to assume with respect to the part B. This bending at whatever angle is desired may be produced in any familiar manner, as by properly forming the dies in which the process of stretching the metal to form the flanges *b* is effected. It will be observed that in making such bend the lug B′, which forms the inner side of the bend, will have a much greater surplus of length to extend along the straight portion of the part A beyond the cross-head, and that that portion of the lug being properly folded up about the part A will constitute a long bracing-seat or shoulder for that part, thus making the joint capable of resisting very great pressure in a direction which would tend to bend the parts A and B toward each other, and this is especially desirable in joints and bends of this sort, because the strain to which the structure is subjected is usually in the direction which would tend to bend the longitudinal bar still farther—that is, to diminish the angle between its two arms or branches.

I do not herein claim the process or any part of the process by which this joint is made, because I have claimed the same in my application numbered 302,188, filed March 6, 1889; but

I claim—

1. In combination, substantially as set forth, the part A of tubular metal, divided longitudinally at the end and having the divided part formed about an axis transverse to the original axis of the said part to constitute a cross-head thereon, and the part B, similarly divided and formed into a cross-head receiving the cross-head of the part A, whereby the two parts A and B are joined together by their cross-heads, respectively, one of which is outside the other, substantially as set forth.

2. In combination, substantially as set forth, the part A of tubular metal, divided at the end and having its divided parts formed about

an axis transverse to the original axis of said part to constitute a cross-head thereon, and the part C, resting in said cross-head and rigid with the ends which form the cross-head.

3. In combination, substantially as set forth, the parts A and B, both of tubular metal and each divided at the end, the divided parts being formed about an axis transverse to the original axis of the part to constitute cross-heads on said parts, respectively, one of said cross-heads being received within the other, and the transverse bar C, located within the inner cross-head.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 22d day of February, 1889.

LUTHER M. COTTLE.

Witnesses:
H. M. DUNLOP,
N. G. HARRIS.