

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to the Repair of Cracked, Broken or Fractured Metal Parts of Articles

- We, METALOCK (BRITAIN) LIMITED, a British Company, of Prudential House, Croydon, Surrey, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- This invention relates to the repair of cracked, broken or fractured parts of articles, particularly cast or moulded metal machine parts.
- A method of repairing is known which comprises connecting the two portions of the part situated on opposite sides of the line of fracture by one or more locking elements of predetermined sizes and shapes which will hereinafter be called "bars", said bars being arranged transversely with respect to the line of fracture, fitted into recesses formed in the material of the part and connected to the latter by a series of keys forced into seatings provided partly in the bars and partly in the walls of the recesses.
- However, such a method has the disadvantage of creating in the part to be repaired separation stresses which are substantially parallel to the line of fracture and which tend to separate the portions of the part which are situated on either side of the bar and on the same side of the line of fracture.
- Even if it can be argued that these stresses are often of no disadvantage because they more or less counteract one another between two parallel bars when the repair requires several of these, this is not true in the case of a single bar or in the case of the end bar of a series, particularly when this is near one side of the part. For example it may very well happen that the portion of the part situated between the side of the part, the line of fracture and the recess, is deformed outwards and may even break when the keys are forced into position. In any case the locking effect of the keys is greatly reduced by the freedom of movement of this portion of the part.
- An object of the present invention is to eliminate or at least substantially reduce this disadvantage.
- According to the invention, a locking bar for repairing cracked, broken or fractured parts of articles comprises an elongated metal bar provided only on one or both long sides thereof with a transversely extending projection each side of which meets the long side of the bar at an acute angle to the longitudinal axis of the bar so that the projection is at least partly undercut and thus serves, when the bar, in use, extends across a crack, break or fracture, to resist stresses tending to arise in a direction parallel to said crack, break or fracture.
- Further, according to the invention a method of repairing cracked, broken or fractured parts of articles comprises the steps of connecting the portions of the part on opposite sides of the fracture line by an elongated locking bar extending transversely to the fracture line and fitting in a correspondingly shaped recess, and inserting keys in a plurality of seatings provided along the interface between the bar and the part partly in the bar and partly in the walls of the recess so as to lock said bar in said recess, said locking bar being provided only on one or both long sides thereof with a transversely extending projection which lies along the fracture line and in a recess in said part on both sides of the line, each side of the projection meeting the long side of the bar at an acute angle to the longitudinal axis of the bar so that the projection is at least partly undercut and thus serves, when the bar, in use, extends across a crack, break or fracture, to resist stresses tending to arise in a direction parallel to said crack, break or fracture.
- It will be seen that by means of the inven-

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tion the harmful effect of the separation stresses is removed because each projection of the bar forms in the portion of the part subjected to these stresses an anchorage which retains the portion and prevents it from moving away from the bar.

In order that the invention may be more readily understood, a number of embodiments thereof will now be described by way of example with reference to the accompanying drawing in which:—

Figure 1 is a plan view of a portion of one side of a fractured article repaired according to the invention, and

Figures 2, 3 and 4 illustrate modifications of the locking bar shown in Figure 1.

Figure 1 shows a portion of a plane metal part P of an article bounded by an edge B and in which a break has occurred along a line L.

In order to carry out the repair, use is made of a locking bar of a general parallelo-piped shape 1, provided on either side with projections 2 and 3 which in plan view have the shape of isosceles trapezia which are integral with the centre part by means of their short bases.

The bar 1, provided with projections 2 and 3, engages in a recess of corresponding shape cut on either side of the line L. Either before or after inserting the bar in the recess seatings are formed which receive, after inserting the bar, a series of keys 4 ensuring the connection between the bar 1 and the part P.

It will be seen that forcing the keys 4 in position creates in the part P four groups of separation stresses, the resultants of which are illustrated by the arrows F1 to F4. It will also be seen that if the part is of large dimensions or if a second bar similar to the first has been placed to the left in the drawing, the stresses F1 and F2 can sometimes be ignored as not causing serious disadvantages, although frequently the distortions which are produced may have a harmful effect on the future behaviour of the part if the repair is carried out as hitherto.

In any case it is certainly not possible to ignore stresses F3 and F4 which are exerted on the portions of the part which are particularly vulnerable because they are separated on three surfaces, namely: on the edge B, along the line L and along the bar. The forces F3 and F4 could therefore separate these two parts, causing the fracture to gape open or may even bring about the breakage of these two parts if the projection 3 did not form a retaining hook in each of them, the undercut surface of which prevents any separation of the parts in question. Furthermore, the fact that these parts are maintained in position ensures full efficacy of the keys located on the corresponding side of the bar.

Figure 2 shows a bar 1 provided with two

projections 6 and 7, the shape of each of which only differs from the preceding projections 2 and 3 by the presence of a concave surface 11. Such a shape may however be preferred for reasons of economy in labour, as they recess which is formed is smaller.

Figure 3 on the other hand, shows a bar 1 provided with two projections 8 and 9 which are almond-shaped. Such a shape gives a particularly high resistance to stresses of the type F1 to F4.

Finally, Figure 4 shows a bar 1 provided with a single projection 10. Such a bar may be sufficient in certain cases if the risk of separation only exists on one side of the bar. Of course, the projection of the bar shown in Figure 4, represented as similar to those of Figure 1, could also take the form of projections 6, 7, 8 or 9.

It is to be clearly understood that numerous modifications could be made to the embodiment of the invention particularly described hereinabove without departing from the scope of the invention.

WHAT WE CLAIM IS:—

1. A locking bar for repairing cracked, broken or fractured parts of articles comprising an elongated metal bar provided only on one or both long sides thereof with a transversely extending projection each side of which meets the long side of the bar at an acute angle to the longitudinal axis of the bar so that the projection is at least partly undercut and thus serves, when the bar, in use, extends across a crack, break or fracture, to resist stresses tending to arise in a direction parallel to said crack, break or fracture.

2. A locking bar according to claim 1 wherein the or each projection is in the shape of a trapezium, connected to the bar by the shorter of the parallel sides thereof.

3. A locking bar according to claim 1 wherein the or each projection is of almond shape.

4. A locking bar according to any one of the preceding claims wherein the or each projection extends from the bar midway therealong.

5. A method of repairing cracked, broken or fractured parts of articles comprising the steps of connecting the portions of the part on opposite sides of the fracture line by an elongated locking bar extending transversely to the fracture line and fitting in a correspondingly shaped recess, and inserting keys in a plurality of seatings provided along the interface between the bar and the part partly in the bar and partly in the walls of the recess so as to lock said bar in said recess, said locking bar being provided only on one or both long sides thereof with a transversely extending projection which lies along the fracture line and in a recess in said part on both sides of the line, each side of the projection meeting the long side of the bar at an acute

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Figure 1 is a plan view of a portion of one side of a fractured article repaired according to the invention, and

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Figure 1 shows a portion of a plane metal part P of an article bounded by an edge B and in which a break has occurred along a

20 line L.

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25 the shape of isosceles trapezia which are integral with the centre part by means of their short bases.

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In any case it is certainly not possible to ignore stresses F3 and F4 which are exerted

50 on the portions of the part which are particularly vulnerable because they are separated on three surfaces, namely: on the edge B, along the line L and along the bar. The forces F3 and F4 could therefore separate

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2. A locking bar according to claim 1 wherein the or each projection is in the shape of a trapezium, connected to the bar by the shorter of the parallel sides thereof.

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5. A method of repairing cracked, broken or fractured parts of articles comprising the steps of connecting the portions of the part on opposite sides of the fracture line by an elongated locking bar extending transversely to the fracture line and fitting in a correspondingly shaped recess, and inserting keys in a plurality of seatings provided along the interface between the bar and the part partly in the bar and partly in the walls of the recess so as to lock said bar in said recess, said locking bar being provided only on one or both long sides thereof with a transversely extending projection which lies along the fracture line and in a recess in said part on both sides of the line, each side of the projection meeting the long side of the bar at an acute



- angle to the longitudinal axis of the bar so that the projection is at least partly undercut and thus serves, when the bar, in use, extends across a crack, break or fracture, to resist stresses tending to arise in a direction parallel to said crack, break or fracture.
5. A locking bar substantially as shown in and as hereinbefore described with reference to the accompanying drawing.
10. 7. A method of repairing fractured parts of articles substantially as described with reference to the accompanying drawing.
8. A cracked, fractured or broken article when repaired by a method as claimed in claim 5 or 7 or by means of one or more locking bars as claimed in any of claims 1 to 4 or 6. 15

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