Feb. 23, 1965 F. C. PALACIO 3,170,420

REFRACTORY BRICK ROOF PATCH ASSEMBLY

Filed Aug. 20, 1963

FIG. 1

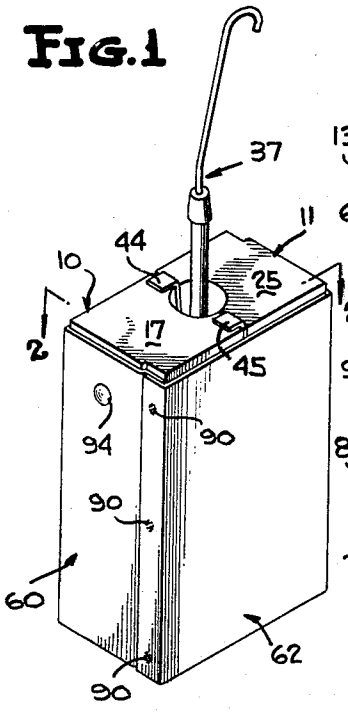


FIG. 2

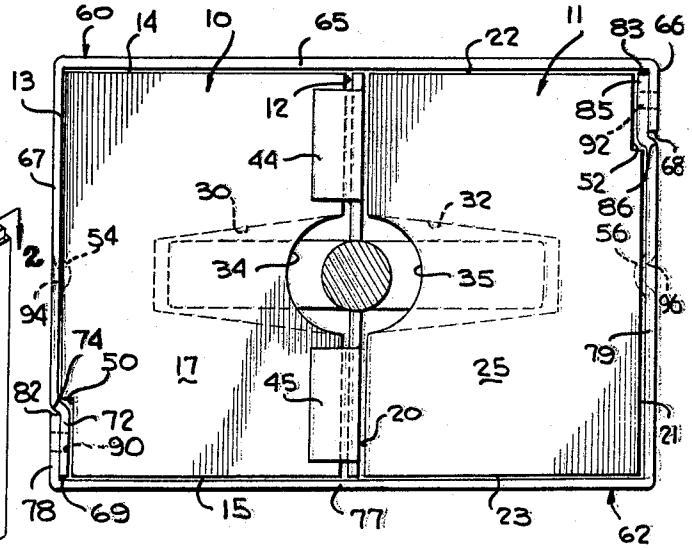
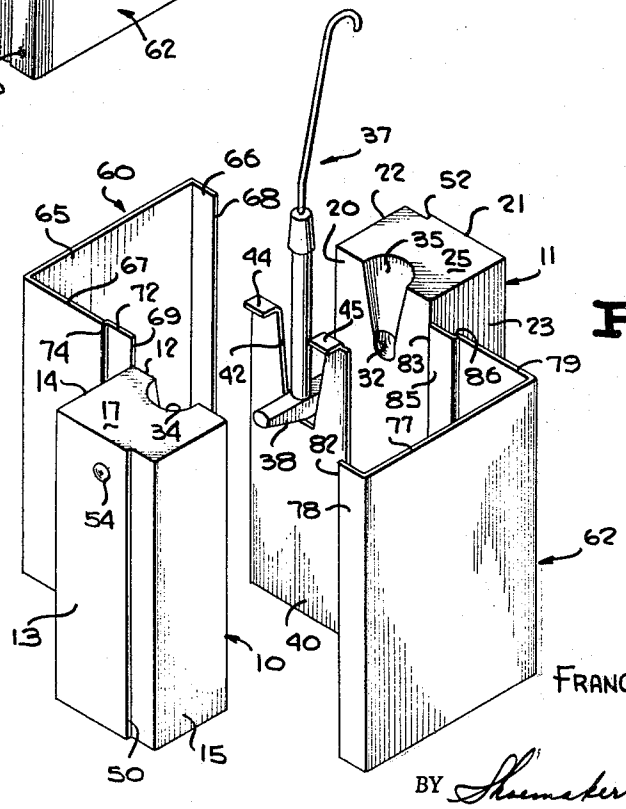


FIG. 3



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REFRACTORY BRICK ROOF PATCH ASSEMBLY

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The present invention relates to a new and novel refractory brick roof patch assembly, and more particularly to the type of assembly which is employed for repairing roofs of hot furnaces while in operation.

The present invention is directed particularly to a refractory brick roof patch assembly employed with furnaces having roofs of the suspended type which are normally supported by conventional hanger means. These assemblies are employed for repairing such furnace roofs while the furnaces are in operation, and this type of assembly opposes certain inherent problems which it is a specific purpose of the present invention to overcome.

It is desired to provide a pair of refractory bodies or bricks which are separated by a metallic separator plate, the bricks being surrounded by a casing means formed of sheet steel or the like, this casing means as well as the dividing plate being suitably held in position while the assembly is being placed in its operative relationship in a furnace roof, the entire assembly being supported by a single common heat resistant hanger means of relatively conventional construction.

Since the assembly of the present invention is designed to replace refractory bricks of furnaces now in operation, it is desired to provide an assembly which forms a substantially perfect rectangular cross-sectional configuration and which also provides substantially perfectly flat surfaces on all four sides thereof. These surfaces should be free of any sort of protrusions or irregularities in the surface which might project outwardly and interfere with the proper placement and positioning of the assembly. In many conventional roof patch assembly constructions, such undesirable outwardly directed portions are generally developed by welding procedures employed therewith or in addition excessive surface voids may be created due to openings created by joints or folds in the sheet steel casings.

It is, of course, important that under normal handling or installation of the assembly in a furnace, neither the dividing plate nor the casing means should slip off, nor should the assembly be allowed in any way to become disassembled or come apart. It is essential that such assemblies hold their shape and rigidity during the time required for installation of the assembly and succeeding adjoining assemblies during the hot patching repair job of a furnace roof.

It has been found in actual practice that where casings are employed of a nature wherein the outer longitudinal edges thereof may be exposed to the heat of the furnace, these edges become distorted and thereby in many instances prevent proper placement of an adjacent assembly in tight relationship against an assembly which is already in position. In addition, stresses created in the casing portions due to such distortions place undue stresses on the welds, and accordingly, these welds break loose when the stresses exceed the sheer limit of the weld area, and accordingly, the situation becomes even more severe since the distorted portions are then allowed to be deflected a substantial distance from the associated refractory bricks.

In the present invention, a pair of refractory bricks are utilized which are of substantially identical size and configuration, these two refractory bricks being normally disposed in closely adjacent relationship with a suitable

dividing plate disposed therebetween, the plate and the bricks being provided with suitable portions for receiving a hanger means for suspending the assembly in operative position.

The entire assembly is surrounded by a casing means comprising a pair of similar casing portions each of which comprises a substantially U-shaped or channel-like member having a relatively short leg and a relatively long leg, these legs being disposed substantially parallel with one another. Each of the long legs of the casing portions is provided with a longitudinally extending offset portion which defines a fold or shoulder between the offset portion and the main body of the long leg portion. The opposite longitudinal edges of the casing portions are defined at the outer ends of the two leg portions, and in the assembled operative position of the components, the offset portion of each of the long legs is disposed within the longitudinally cutout portion provided in an outwardly directed face of each of the refractory bricks.

The short leg of each of the casing portions is disposed within the offset portion of the long leg of the opposite casing portion such that the outer surface of each of the short legs of the two casing portions is substantially flush with the outer surface of the long leg portion of the opposite casing portion. This ensures substantially flat outer surfaces at opposite sides of the assembly. The short leg portions of each of the casing portions are fixedly secured to the offset portions of the opposite casing portion by means of spot welding techniques and the like.

With the above-described arrangement of the casing portions, the longitudinal edge of each of the casing portions at the long leg thereof is completely protected by the opposite casing portion, while the longitudinally extending edge of the short leg of each of the casing portions is at least partially protected by the shoulder defined between the offset portion and the main body of the long leg portion of the opposite casing portion. The opposite longitudinal edges of the casing portions are thereby protected from direct exposure to the furnace heat, and in the distortion of the short leg portion, if such should develop, can only extend the length of the short leg of the casing portions and is thereby limited to small proportions. Likewise, the longitudinal or resultant components of such distortion are therefore small and limited. With any possible distortions limited in this manner, undue stresses are eliminated and the weld points are relieved accordingly.

The casing means is retained in operative position relative to the refractory bodies or bricks by projection means which extend inwardly from each of the casing portions, these projection means being received within suitable indentation means formed in the associated refractory bodies.

In addition, the substantially flat outer surfaces are possible due to the utilization of spot welding techniques which prevents any outwardly bulging or projecting portions at the places where the two casing portions are welded to one another.

By so protecting the opposite longitudinal edges of the casing portions as discussed above, the assembly is enabled to hold its shape and rigidity during the time required to install it and any succeeding adjoining assemblies during a hot patching repair job on a furnace roof. Furthermore, the means as discussed above ensures that the casing means will remain in place under normal handling or installation procedures, and additionally the dividing plate disposed between the refractory bricks is held in its operative position by providing laterally extending tabs at the upper end thereof which engage an upwardly directed face of one of the bricks thereby posi-

tively preventing the dividing plate from sliding down between the bricks during handling or installation.

An object of the present invention is to provide a new and novel refractory brick patch assembly which includes a pair of refractory bricks separated by a sheet steel plate and surrounded by a sheet steel casing and suspended in operative position by a single common heat resistant hanger.

Another object of the invention is the provision of a refractory brick roof patch assembly which is substantially rectangular in cross-sectional configuration and which includes four substantially flat outwardly directed side surfaces.

A further object of the invention is to provide a refractory brick roof patch assembly including means for assuring that the casing and dividing plate means will remain in proper operative relationship during normal handling and installation procedures.

Still another object of the invention is the provision of a refractory brick roof patch assembly which will hold its shape and rigidity during the time required to install it and any succeeding adjoining assemblies during a hot patching repair job of a furnace roof.

A still further object of the invention is to provide a refractory brick roof patch assembly which is quite simple and inexpensive in construction, and yet at the same time is quite sturdy and reliable in operation.

Other objects and many attendant advantages of the invention will become more apparent when considered in connection with the specification and accompanying drawings, wherein:

FIG. 1 is a top perspective view of a roof patch assembly according to the present invention;

FIG. 2 is a sectional view taken substantially along line 2—2 of FIG. 1 looking downwardly in the direction of the arrows; and

FIG. 3 is a top exploded perspective view illustrating the construction and interrelationship of the components of the assembly of the present invention.

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, the refractory brick roof patch assembly of the present invention includes a pair of bodies of refractory material or refractory bricks indicated generally by reference numerals **10** and **11**. Refractory brick **10** includes a front face **12**, a rear face **13** and a pair of opposite side faces **14** and **15**. The brick may be substantially rectangular in cross-sectional configuration with the front and rear faces substantially parallel with one another as are the opposite side faces **14** and **15**.

In a like manner, the refractory brick **11** is provided with a front face **20** and a rear face **21** joined by a pair of opposite side faces **22** and **23**.

The bricks **10** and **11** are provided with upwardly directed cold or top faces **17** and **25**, it being understood that the bricks are also provided with opposite hot or bottom faces which are disposed substantially parallel with the top faces **17** and **25** and further which are adapted to be directed toward the interior of the furnace in a well-known manner.

Bricks **10** and **11** are provided with cutout portions **30** and **32** respectively which extend inwardly from the front faces thereof, and cutout portions **34** and **35** respectively are formed in these bricks and extend upwardly in a tapered relationship to the top faces **17** and **25** respectively. These cutout portions are adapted to receive and accommodate a conventional hanger **37** having a foot portion **38** at the lower end thereof, this foot portion being adapted to extend within the portions **30** and **32** of the bricks. The suspension assembly including the hanger means and the cutout portions formed in the bricks is of well-known conventional construction.

A divider plate **40** which may be formed of sheet steel and the like is formed of such a size as to be coincident with the front faces of the two bricks, the divider plate

being provided with a central cutout portion **42** in the upper part thereof for accommodating the hanger. The divider plate is also provided with a pair of laterally extending tab or flange portions **44** and **45** at the uppermost end thereof, these tab portions being adapted to rest upon a top face such as **17** of brick **10** for retaining the divider plate in operative assembled relationship and preventing it from slipping down between the two bricks as will be well understood.

Each of the bricks is provided with a longitudinally extending cutout portion in the rear face thereof, these cutout portions being indicated by reference numerals **50** and **52** for the bricks **10** and **11** respectively, it being noted that each of the cutout portions extends longitudinally throughout the length of the bricks so as to define a groove in the bricks on the rear faces thereof at one of the corners where the rear face joins one of the side faces.

Each of the rear faces of the bricks is provided with an indentation means which in the present invention may comprise arcuate recesses **54** and **56** formed in faces **13** and **21** respectively as may be seen particularly in FIG. 2. Any number of such recesses may be employed, a single recess being shown for the sake of simplicity. The purpose of these recesses will be more clearly hereinafter set forth.

The casing means of the present invention includes a pair of substantially identical casing portions **60** and **62** formed of sheet steel or the like. Each of these casing portions is substantially U-shaped in cross-sectional configuration or in other words comprises a channel-like member.

Casing portion **60** includes a base portion **65** from which extend a pair of legs or flanges **66** and **67**. It will be noticed that leg portion **66** is relatively short as compared to leg portion **67** since leg portion **67** extends outwardly a substantialliy greater distance than leg portion **66** from the base portion **65**. Each of these leg portions or flanges extend substantially parallel with one another and normal to the base portion **65**. The opdicated by reference numerals **68** and **69**.

The relatively long leg portion **67** includes an offset portion **72** which as seen most clearly in FIG. 2 is offset with respect to the remainder of the leg portion and is disposed substantially parallel therewith. A shoulder portion **74** is defined between the offset portion **72** and the main body portion of leg portion **67**.

Casing portion **62** in a similar manner includes a base portion **77**, a short leg portion or flange **78** and a long leg portion or flange **79**. The opposite longitudinally extending edges of casing portion **62** are indicated by reference numerals **82** and **83**, and the long leg portion **79** includes an offset portion **85**, a longitudinally extending shoulder **86** being defined between the offset portion **85** and the main portion of the leg portion **79**. It is evident that the two portions **60** and **62** are substantially identical and are adapted to be fitted together as indicated in FIG. 2 of the drawings.

As seen in FIG. 2, the offset portions **72** and **85** of the casing portions **60** and **62** fit respectively within the cutout portions **50** and **52** in the rear faces of the bricks **10** and **11**. It will also be noted that the short leg portions **66** and **78** fit respectively over the offset portions **85** and **72** such that the outer surfaces of the short leg portions **66** and **68** are substantially coplanar with the outer surfaces of the longer leg portions **79** and **67** of the other casing portions. The short leg portion **78** is fixedly secured to the offset portion **72** by a plurality of spot welds **90** which may be spaced longitudinally along the short leg portion and the short leg portion **66** is secured to the offset portion **85** by a plurality of similar spot welds **92**. It is apparent with this arrangement that the spot welds will not produce any protuberances or bulges extending outwardly from the casing portion

and substantially flat side surfaces are afforded to the completed assembly.

The casing portoins **60** and **62** are also provided with inwardly extending projection means in the form of dimples or embossments **95** and **96** which are formed in the long leg portions **67** and **79** respectively of these two casing portions. These inwardly extending projection mean are adapted to fit within the recess means **54** and **56** provided in bricks **10** and **11** respectively. It is apparent that interengagement of the projection means with the recess means will retain the casing means in the proper operative position in surrounding relationship to the bricks and will prevent the casing means from slipping out of such proper position.

It is apparent from the foregoing that the refractory brick roof patch assembly of the present invention comprises a pair of refractory bodies or bricks which are substantially of the same size and configuration, these two bodies or bricks being separated by a divider plate formed of sheet steel and the like. The bodies or bricks are surrounded by a circumferentially extending casing means formed of sheet steel and the like, and the entire assembly is adapted to be suspended from a common heat resistant hanger. The completed assembly provides a substantially rectangular cross-sectional configuration with the four outer surfaces thereof being substantially flat and without excessive surface voids. There are no outwardly extending protrusions or projections, and in particular, it will be noticed that the opposite longitudinally extending edges of each of the casing heat of an associated furnace. It will be noted that the longitudinally extending edges of each of the casing portions at the outer ends of the longer legs of the channel-shaped casing portions are completely protected by the base portion of the opposite casing portion. Also, it will be noted that the longitudinally extending edges along the shorter legs of each of the casing portions are partially protected by the shoulder portions defined between the offset portion and the main portion of the longer leg of the opposite casing portion. This arrangement ensures that the assembly will hold its shape and rigidity during the time required to install it and any succeeding adjoining assemblies during the hot patching repair job of a furnace roof. In addition, the dividing plate between the two bricks is retained in its operative position by the laterally offset tab portions formed at the upper end thereof, these tab portions being adapted to engage the upwardly directed face of an adjacent brick so as to positively prevent the plate from sliding down between the bricks during normal handling or installation procedures. The casing means is retained in its operative position by means of the inwardly directed projection means which are adapted to be disposed within the outwardly facing recess means formed in the adjacent bricks. This positively ensures that the casing means cannot be improperly displaced or slip off of the bricks during handling or installation procedures. It is also apparent that the assembly of the present invention is quite simple and inexpensive in construction, and yet is quite sturdy and reliable in use.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, and since the scope of the invention is defined by the appended claims, all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents are therefore intended to be embraced by those claims.

I claim:

1. A refractory brick roof patch assembly comprising a pair of bodies of refractory material of similar configuration, each of said bodies including a longitudinally extending cutout portion formed in one of the outwardly directed faces thereof, said bodies being disposed in closely spaced relationship to one another, casing means disposed in surrounding relationship with said bodies, means for retaining said casing means in operative position with respect to said bodies, said casing means comprising a pair of identical metallic portions, each of said portions including opposite longitudinally extending edges, each of said portions including a longitudinally extending offset portion adjacent one of said edges, said offset portion of each of said casing portions fitting within the cutout portion of one of said bodies, said offset portion also receiving the other longitudinal edge portion of the other of said casing portions so as to overlie said offset portion whereby the assembly defines a substantially rectangular cross-sectional configuration with flat outer surfaces, said one edge portion of each of said metallic portions being completely protected by the other metallic portion from direct exposure to the heat of a furnace, the other longitudinal edge portion of each of said metallic portions being at least partially protected by the other metallic portion from direct exposure to the heat of a furnace.

2. An assembly as defined in claim 1 wherein longitudinally extending portions of said casing portions adjacent the opposite longitudinal edges thereof are secured to one another by spot welding.

3. A refractory brick roof patch assembly comprising a pair of bodies of refractory material of substantially identical size and configuration, each of said bodies including front faces adapted to be disposed in opposed facing relationship with one another, rear faces disposed opposite said front faces, and a pair of opposite side faces, each of said rear faces having a longitudinally extending cutout portion formed therein, casing means disposed in surrounding relationship with said pair of bodies, said casing means including a pair of substantially identical portions each of which is of a metallic channel-like construction, each of said channel-like portions including a short flange at one side thereof and a long flange at the opposite side thereof, each of said long flanges having an offset portion formed longitudinally therealong adjacent the outer longitudinal edge thereof and defining a longitudinally extending shoulder, said offset portion fitting within a cut out portion of one of said bodies, said offset portion receiving outwardly thereof the short flange of the opposite casing portion with the outer longitudinal edge of said short flange disposed adjacent said shoulder so as to be at least partially protected from direct exposure to the heat of a furnace, said casing portions being fixedly secured to one another adjacent the opposite longitudinal edge portions thereof to define an assembly of substantially rectangular cross-sectional configuration with flat outer surfaces.

4. An assembly as defined in claim 3 wherein each of said casing portions includes a preformed inwardly directed projection means, said bodies each including a preformed indentation means for receiving said projection means whereby said casing means is retained in operative position in surrounding relationship to said bodies.

5. Apparatus as defined in claim 3 wherein said casing portions are fixedly secured to one another by spot welding.

6. A refractory brick roof patch assembly comprising a pair of refractory bricks, each of said bricks being of elongated configuration and including substantially flat front and rear faces on opposite sides of each brick and a pair of opposite side faces joining said front and rear faces, each of said front faces including cutout portions for receiving a hanger, an intermediate spacer plate disposed between the front faces of each of said bricks, each of said bricks having a longitudinally extending cutout portion formed along the rear face thereof at one edge thereof, casing means disposed in surrounding relationship with said pair of bricks, said casing means including a pair of separate metallic portions each of which is substantially U-shaped in cross-sectional configuration and includes a base portion and a pair of leg portions, one of said leg

portions being a relatively short leg and the other of said leg portions being a relatively long leg, said legs terminating in opposite longitudinally extending edges of said casing portions, each of said relatively long legs of each casing portion having a longitudinally extending offset portion formed therein adjacent the associated longitudinally extending edge to define a longitudinally extending shoulder, said offset portion fitting within the longitudinally extending cut out portion in the outer face of one of said bricks, the relatively short leg of each of said casing portions being disposed outwardly of and fitting within the offset portion of the opposite casing portion with the outer longitudinal edge of said short leg disposed closely adjacent said shoulder so as to at least partially protect said last-mentioned edge from direct exposure to the heat of a furnace, and such that the outer surfaces of the relatively long leg of each casing portion are substantially coplanar with the relatively short leg of the opposite casing portion, the relatively short leg portion of each casing portion being fixedly secured to the offset portion of the relatively long leg portion of the opposite casing portion so as to define an assembly which is of substantially rectangular cross-sectional configuration and wherein the outwardly facing sides thereof are substantially flat, the longitudinally extending edge of each of said long flanges being disposed adjacent the inner surface of the opposite channel-like portion to completely protect said last-mentioned edges from direct exposure to the heat of a furnace.

7. An assembly as defined in claim 6 wherein each of said casing portions includes a preformed inwardly directed projection means formed on the relatively long leg portion thereof, each of said bricks including a preformed indentation means for receiving said projection means, said indentation means being formed in the rear face of each of said bricks.

8. An assembly as defined in claim 6 wherein said intermediate spacer plate includes a cutout portion for receiving a hanger, said cutout portion being formed in the upper central portion of said plate, and said plate including a pair of spaced laterally offset tabs at the upper end thereof for retaining said plate in operative position between said bricks.

9. An assembly as defined in claim 8 wherein said casing portions are fixedly secured to one another by spot welding.

10. A refractory brick roof patch assembly comprising a pair of refractory bricks each including front faces adapted to be disposed in opposite facing relationship to one another, rear faces disposed in parallel relationship to said front faces, and each of said refractory bricks including a pair of opposite side faces joining said front and rear faces, each of said bricks having recess portions formed in the front faces thereof for receiving hanger means, said recess portions being formed in the central upper part of the front faces thereof, each of said bricks including a longitudinally extending cutout portion extending throughout the length of the brick and formed in the rear face thereof at one edge portion where the rear face joins with one of said side faces, said bricks also each including in the rear face thereof a preformed indentation for receiving a cooperating projection, a metallic spacer plate disposed between and in engagement with the front faces of said bricks, said plate extending throughout the length of said front faces and including a cutout portion in the central upper part thereof for receiving hanger means, said spacer plate also including at the uppermost end thereof a pair of spaced offset tabs for engaging the uppermost face of one of said refractory bricks for retaining said spacer plate in operative position between said bricks, casing means disposed in surrounding relationship with said bricks and comprising a pair of metallic channel-like portions, each of said channel-like portions including a relatively short flange formed along one end thereof and terminating in one longitudinal edge portion of the casing portion, each casing portion including a substantially long flange portion terminating in the opposite longitudinally extending edge portion of the casing portion, said flanges being disposed in substantially parallel relationship with one another, the long flange portion of each of said casing portions including adjacent the associated longitudinal edge thereof an offset portion which is received in the cutout portion of one of said bricks, the short flange portion of each of said casing portions being received within the outwardly facing portion of the offset portion of the other casing portion such that the longitudinally extending edge of each of said long flange portions is disposed closely adjacent the opposite casing portion so as to be completely protected by the opposite casing portion, said long flanges each defining a shoulder portion at said offset portions, the longitudinally extending edge of each of said short flanges being disposed closely adjacent to one of said shoulder portions so as to at least partially protect the last-mentioned longitudinally extending edge from exposure to the heat of a furnace, said short flange portions being secured to said offset portions, each of said casing portions including a preformed inwardly directed projection means which is received in said indentation means formed in each of said bricks for retaining said casing means in operative position about said bricks.

11. An assembly as defined in claim 10 wherein said short flanges are secured to said offset portions by a series of spaced longitudinally extending spot welds.

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