May 29, 1923.

1,457,008

R. S. SMITH

SELF ANCHORING RIVET

Filed Oct. 20, 1919

FIG. 1.

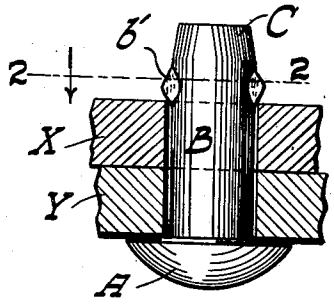


FIG. 3.

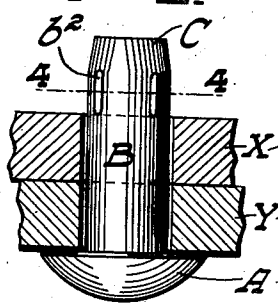
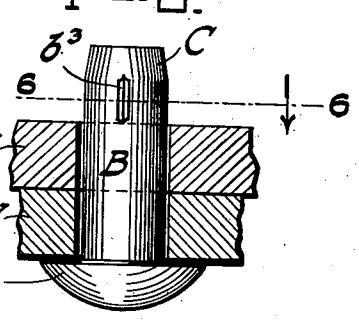


FIG. 5.



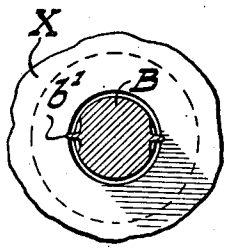


FIG. 2.

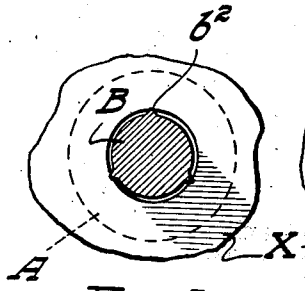


FIG. 4.

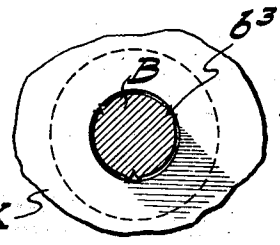


FIG. 6.

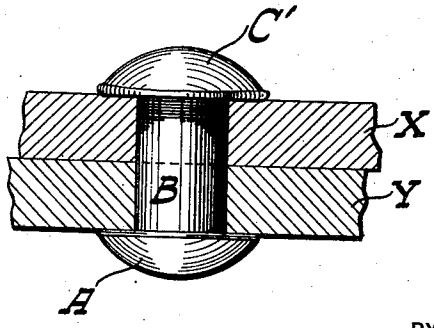


FIG. 7.

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DEL.

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UNITED STATES PATENT OFFICE.

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SELF-ANCHORING RIVET.

Application filed October 20, 1919. Serial No. 331,994.

To all whom it may concern:

Be it known that I, REUBEN STANLEY SMITH, a citizen of the United States, and residing in the city of Milwaukee, county of Milwaukee, and State of Wisconsin, have invented a new and useful Improvement in Self-Anchoring Rivets; and I do declare that the following is a full, clear, and exact description thereof, such as will enable persons skilled in the art to which the invention pertains to make and use the same, reference being had to the drawings hereto attached and forming part of my specification for disclosure as to certain details of construction and operation.

My invention relates to rivets.

In its present form, the invention is embodied in a construction which will effect the retention temporarily of the loose rivet when the latter is inserted in the holes in the metal plates which it is used to unite, so as to insure the rivet being in position when the plates are presented to the riveting machine.

In the manufacture of automobile and other vehicle frames, as well as other frames from metal plates, the side bars and cross and end bars, or other elements of the frame, after being formed and perforated in accordance with the design of the frame, are assembled in their several relative positions and clamped temporarily so that such elements may be riveted together at the proper points.

In present machine shop practice, such riveting is effected by power driven riveting machines, the rivets being inserted in the punched holes by hand, prior to the riveting operation, and in order to prevent such rivets from falling out when the assembled and clamped frame elements are carried to the riveting machine, the end or point of the rivet is slightly upset or spread initially by a blow with a hammer in the hand of a workman. The tendency of the rivets to fall out of the holes in the frame elements. is due to the fact that some of such rivets, somewhat loosely held in the holes in the plates, are presented to the riveting machine, heads down. The practice of thus inserting the rivets and securing them preliminarily in the holes in the parts which they are to unite, is not always productive of the desired results, inasmuch as the frame in its various stages of completion is subjected to many jars and shocks, which are incident to its assembling and movement in the riveting operations, and it frequently happens that rivets so temporarily held will fall out. In such exigencies, the riveting operation is interrupted until other rivets can be inserted in the place of the missing ones. This delay involves a loss in production. In the actual riveting operation, the head of the rivet rests upon the anvil of the machine, while the end or point of the rivet is completely upset or spread by a blow by the vertically moving, power actuated hammer, to effect a permanent union of the parts.

Again, it has been observed that rivets the shanks of which are calculated to engage only with a driving fit the walls of the holes in the plates which they are to unite, cannot be relied upon to remain in position upon being inserted, and that these rivets will sometimes work loose and fall out. This is due to various causes, among which is that of the rotations and severe vibrations which occur in handling the frames. Moreover, the frictional engagement of the rivets with the holes in the plates is not always in the same degree, due to the varying diameters of the shanks of the rivets, resulting from variations in the stock and an imperceptible wearing away of the dies used in forming such rivets.

The purpose of my invention is the production of a specially designed rivet, which when driven preliminarily into the holes in the plates, will be positively anchored or held in its position and displacement prevented, irrespective of the vibrations to which the frame may be subjected while being assembled and in transit to the riveting machine, or during the riveting operation. As a direct result of my invention, the former practice of initially upsetting or spreading the point of the rivet to prevent the latter from falling out is eliminated, and the presence of a rivet in proper position for action by the riveting machine is always assured, with the consequent saving of the time heretofore consumed in replacing the occasionally missing rivets.

My present invention in its preferred form has been embodied in a rivet, the solid shank of which is provided with projections, ribs or burs, which extend to a point, which, measured from the head of the rivet, lies at a distance exceeding that of the thickness of the plates to be united, and through

which the rivet passes. If the rivet be calipered on a line intersecting these projections, it will be found that its diameter at such line exceeds slightly the size of the registering holes in the plates which the rivet is to unite. The enlargement thus formed by the projections on the shank of the rivet, acts most effectively to prevent retractive movement by the rivet in the handling of the frame, following the insertion of the rivet.

The present invention is one of the developments arising from my newly devised system of producing automobile frames by a series of related and connected mechanical operations. In a previous application filed January 21, 1918, Serial No. 212,934 and patented November 15, 1921, #1,397,020, I have disclosed an assemblage of machines which have inter-related operations, whereby from metal sheets supplied at one end of the assemblage, contoured blanks to form side bars and cross and end bars, and other structural elements, are punched, duly shaped, perforated, machined, assembled and riveted, in such succession that completed automobile frames are turned out by purely automatic operations, on a schedule providing for the delivery of a definite number of finished frames per minute.

One feature of the said assemblage is the riveting department, in which is employed a number of automatic riveting machines, the operation of which is preceded by the action of rivet inserting devices, which serve the rivets to the frame in transit through the assemblage, and which insert the rivets in the rivet holes provided therefor in the several frame elements. These rivet inserting devices operate generally in the manner disclosed in the above mentioned patent.

In the operation of the assemblage above referred to, it has been necessary to provide some means whereby the rivets, particularly those inserted from the under side of the frame and presented with points upward, will remain in their respective positions until action by the riveting machines thereon has taken place, and my present invention has enabled me to achieve this very desirable result in a most expeditious and effective manner.

Having disclosed in the foregoing, the nature and purposes of my present invention, I will now describe the manner in which the said invention is constructed and utilized, and shall conclude this specification with claims directed to the novel features of such invention.

In the accompanying drawings,

Figures 1, 3 and 5, are views in elevation showing some of the various forms in which my invention may be embodied, these figures showing also the rivets, as passing through the metal plates which are to be united, such plates being sectioned on a line passing through the vertical central plane of the rivets.

Figures 2, 4 and 6 are cross-sectional views on the lines 2—2, 4—4 and 6—6, respectively, of Figures 1, 3 and 5, looking in the direction indicated by the arrows.

Figure 7 is a view similar to Figures 1, 3 and 5, but showing the relation of the parts after the riveting operation has taken place, the point of the rivet having been upset and spread over the face of the contiguous plate, and the shank expanded to fill the rivet holes, to complete the union of the two plates.

In the drawings, X and Y, designate two of the metal plates of an automobile frame, the said plates being shown in section upon a line intersecting the point at which they are to be united. The plates X and Y, are referred to only for the purpose of illustrating conventionally the manner in which my invention is to be applied. In actual practice, the plates thus referred to will or may be the side-bar and a cross-bar, or other elements of the frame, which are to be united by a riveting operation.

Automobile frames as now constructed, are formed from sheet metal plates. Such plates as are used in the production of side bars, and end and cross bars, are flanged to impart the necessary rigidity. In some parts the parallel flanges are in such proximity that an inside riveting operation is rendered difficult, by reason of the near approach of the flanges to each other, and the impracticability of operating a riveting hammer in the restricted space between the flanges. To overcome this difficulty, the rivets have been inserted from within the channel of the flanged bar, with the end or point of the rivet extending outwardly, so as to be accessible by the hammer of the riveting mechanism, the head of the rivet being backed up by the anvil, which latter is inserted in the channel of the bar.

In uniting the elements, of an automobile frame, I employ a rivet of novel construction. Such novel rivet is comprised of a head A, and a solid shank B, as usual, and may or may not have its end or point tapered as at C, also as usual in either formation; but it has been found in practice, that the operation of inserting rivets by means of mechanical devices is facilitated in cases where rivets with a tapering or pointed end extending beyond the enlargement are used. At points lengthwise of the rivet I provide the solid shank thereof with one or a plurality of axial projections, ribs or burs, which enlarge to a slight degree the diameter of the shank of the rivet. In Figures 1 and 2, the projections b', are produced by the pressure of dies which cause portions of the metal from which the rivet is formed,

to extrude slightly beyond the cylindrical plane of the shank of the rivet, and thus produce the enlargement described. The ribs b^2, shown in Figures 3 and 4, may be produced in the same manner, or by roller dies which will effect a similar extrusion of metal from the shank of the rivet. The construction shown in Figures 5 and 6, is produced by indenting the shank of the rivet with axially extending scored lines, the effect of which operation is to produce the burs b^3, by a like extrusion of metal upon the surface of the shank of the rivet.

For the purpose of clearness of illustration, the drawings have been made to show the features somewhat magnified. But it will be understood that the invention in its preferred form embodied in a rivet the shank of which is provided with an enlargement, which measured from the head of the rivet, extends to a point the distance of which exceeds slightly the thickness of the plates to be united by such rivet, and that the diameter of the rivet at such point will be made to exceed that of the hole in the plates. The enlargement upon the shank of the rivet need not be exactly of the relative locations and dimensions shown, but such enlargement may, in some instances, commence at any suitable point within the compass of the combined thickness of the plates to be riveted. In other words, the cylindrical portion of the shank of the rivet between the head thereof and the enlargement thereon, may be of a length which is less than the thickness of the plates through which the rivet is passed. While this latter construction is within the scope of my invention, and is suitable for some classes of work, it has been found that the rivet formed in the manner shown in the drawings is preferable and best adapted for all classes of work, as will presently be described.

Adverting to the drawings, it will be observed that a clearance between the rivet and the walls of the hole in the plates is provided in Figures 1, 3 and 5. In practice, a clearance of approximately 1/64 of an inch will be sufficient for the purposes of my invention. The resistance offered by the enlargement on the shank of the rivet to the passing of the rivet into the hole in the plates, is overcome by the superior force of the rivet inserting devices. In such passing, the portions of metal extruded from the shank of the rivet and constituting the said enlargement, will be compressed in a minute degree by the resistance exerted by the walls of the holes in the plates. At the same time, the walls of the holes in the plates will be indented or scored by compression of the material in a slight but similar degree, this action being due to the counter-pressure exerted radially by the enlargement on the shank of the rivet. When the enlargement on the shank of the rivet, or the forward end of such enlargement, has passed clear of the hole in the plates, the inherent resiliency of the metal of which the rivet is formed, will assert itself, and the enlargement, whatever may be its form, will be found to have so expanded that the rivet will be securely held against displacement by the vibrations incident to the subsequent handling of the assembled frame. The rivet can be dislodged from such position only by a direct blow upon the end or point thereof. In the forms in which I have chosen to illustrate my invention, the rivet will be free to rotate, but there will be an absence of any liability to fall from the hole in which it has been placed by the rivet inserting devices.

When subjected to the action of the riveting machine, the end or point of the rivet is spread in the manner indicated at C', in Figure 7, so as to unite the plates through which it is passed, and form a complete head which is the counterpart of the head A. The compression of the metal which takes place expands the shank of the rivet, so that the hole in the plates is entirely filled, as shown in Figure 7.

While I have described my present invention as especially designed for use in connection with the rivet inserting devices and riveting machines constituting elements of the assemblage above referred to, it is to be understood that the use of the invention is not to be limited to such assemblage, but that it may be used in relations other than those described, and further, that it may be used in certain classes of work in which the rivet inserting and spreading operations are performed by hand.

The gist of the invention resides in the provisions described, whereby the rivet when initially positioned in the rivet holes in the plates is sufficiently anchored or held in place and cannot be dislodged by the ordinary rough handling of the parts to be united. The manner of its application and the conditions attending its use are not involved in the present invention. The enlargement on the shank of the rivet, whereby its anchorage in position prior to the riveting operation is effected, may be of forms other than those shown, and the extent of such enlargement axially and the relative location with respect to the shank of the rivet may be varied at pleasure, but preserving always the essentials of my invention regardless of the structural aspects of the rivet.

In some of the appended claims, in defining my invention, I have described the provisions for effecting the preliminary and positive anchorage of the rivet in position pending the riveting operation, as "means

on the rivet" or "means thereon," and by such expression I mean that the anchoring provisions form a part of the rivet structure. I disclaim the use of adjunctive holding devices for engaging the shank of a plain rivet not having self anchoring provisions as in my invention.

Nor is my invention to be limited to the specific constructions disclosed herein, or in the above mentioned patent, the fundamental principle of such invention being a rivet designed to temporarily connect the parts to be riveted together, and which is provided structurally with means which will also serve to anchor or hold the rivet in position preliminarily to the performance of the subsequent permanent riveting operation.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. A rivet provided with means for preliminarily anchoring or holding it in position pending the riveting operation, such means comprising an enlargement on the shank spaced from the head.

2. In combination with perforated metal plates to be united, a rivet the shank of which is provided with an enlargement exceeding the diameter of the hole in the metal plates, whereby such rivet is preliminarily anchored or held in position pending the riveting operation.

3. A rivet the end point of the shank of which is provided with a plurality of circumferentially arranged radial projections, whereby the rivet is preliminarily anchored or held in position pending the riveting operation.

4. In combination with a plurality of perforated metal plates to be united, a headed rivet, and means formed on the rivet for preliminarily anchoring or holding the rivet in position pending the riveting operation, such means effecting a temporary locking engagement of the rivet with the plate most remote from the head of the rivet.

5. As a new manufacture, a rivet having an enlargement on its shank near the point, the diameter through the shank and enlargement exceeding that of the hole in which the rivet is to be inserted, whereby the rivet is temporarily anchored or held in position pending the riveting operation.

6. Perforated members to be united, in combination with a headed rivet to unite the said members, the said rivet being provided on its shank with an enlargement, the diameter of the shank and its enlargement exceeding that of the perforations in the members, whereby compression of the enlargement occurs in forcing the rivet into the perforations, and wherein by expansion of the enlargement the rivet is positively anchored or held in position pending the spreading of the point of the rivet to unite the said members.

7. A rivet having means formed thereon for preliminarily anchoring or holding the rivet in position pending the riveting operation, such means being located at the end point of the rivet.

8. A rivet provided with means for preliminarily anchoring or holding it in position pending the riveting operation, such means comprising an enlargement on the shank of the rivet.

9. A rivet the shank of which, adapted to enter a rivet hole, is provided with means formed thereon for preliminarily anchoring or holding the rivet pending the final riveting operation.

10. A rivet adapted to temporarily hold parts in assembled relation for permanent connection by a subsequent riveting operation, the said rivet being provided with means formed as a part thereof for preliminarily anchoring or holding the rivet in position pending such operation.

11. A rivet adapted to be entered in holes in parts to be united and to temporarily hold the parts in assembled relation, the said rivet being provided with means formed thereon to anchor or hold the rivet in position preliminarily to the performance of the riveting operation.

12. A headed rivet having a solid shank on which is formed an enlargement, the diameter of the shank and the enlargement exceeding the diameter of perforations in parts to be united, the point of the rivet being adapted to be freely entered in the perforations and the rivet anchored or held in position by such enlargement pending the final riveting operation.

13. A pointed rivet having a solid shank on which is formed an enlargement, the diameter of the shank and the enlargement exceeding the diameter of perforations in parts to be united, the point of the rivet being adapted to be freely entered in the perforations and the rivet anchored or held in position by such enlargement pending the final riveting operation.

14. A pointed and headed rivet having a solid shank on which is formed an enlargement, the diameter of the shank and the enlargement exceeding the diameter of perforations in parts to be united, the point of the rivet being adapted to be freely entered in the perforations and the rivet anchored or held in position by such enlargement pending the final riveting operation.

In testimony whereof, I have signed my name at Milwaukee, this 9th day of October, 1919.

R. STANLEY SMITH.

Witnesses:
W. F. WOOLARD,
C. THEO. OSTERBERG.