METHOD OF JOINING STRIP MATERIAL

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ABSTRACT

The method of bonding a pair of strips of material together, comprising, simultaneously deforming a portion of material out of each of the sheets and then longitudinally moving the sheets with respect to each other whereby the deformed portions will interlock to bond the sheets together. The joint formed by deforming the sheets effectively bonds the two sheets together thereby preventing any separation thereof.

3 Claims, 8 Drawing Figures
METHOD OF JOINING STRIP MATERIAL

This application is a continuation of application Ser. No. 665,875, now abandoned, filed Sept. 6 1967.

In working with rolls or coils of metal sheets or the like it is necessary from time to time to secure sheets together in metal processing operations which require continuous operation or uninterrupted strips. In these operations, an unsatisfactory connection between the tail end of one sheet and the lead end of a second sheet will result in "losing" a production line. That is, the entire production line must be shut down so that the two sheets can be secured together to obtain the continuous operation or uninterrupted strip. Some attempt has been made to join two strips or sheets together by rolling the edges thereof but this method is unsatisfactory for use on extremely hard metals. The hard metals will break when an attempt is made to roll the edges thereof.

Therefore, it is a principal object of this invention to provide a method of bonding a pair of sheets of material together.

A further object of this invention is to provide a method of bonding a pair of sheets of material which provides for interlocking the two sheets upon the sheets being placed in tension.

A further object of this invention is to provide a method of bonding a pair of sheets or strips together wherein a portion of material is simultaneously deformed out of each of the sheets or strips and the strips are then longitudinally moved with respect to each other to cause the interlocking of the same.

A further object of this invention is to provide a method of bonding a pair of sheets of material together which will satisfactorily bond sheets comprised of extremely hard metal.

A further object of this invention is to provide a method of joining strip materials which permits continuous operation or uninterrupted strip operations.

A further object of this invention is to provide a metal stitch or joint which bonds a pair of superimposed sheet members together.

A further object of this invention is to provide a method of joining strip materials which does not require foreign material such as bolts or rivets.

A further object of this invention is to provide a method of joining strip materials which is economical.

These and other objects will be apparent to those skilled in the art.

This invention consists in the construction, arrangements, and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in the claims, and illustrated in the accompanying drawings in which:

FIG. 1 is a fragmentary perspective plan view of a pair of rolls of sheet material having portions fastened together with a plurality of joints;

FIG. 2 is a fragmentary cross-sectional view illustrating the male and female die head which is used to form the joint of this invention;

FIG. 3 is a fragmentary perspective view of two sheets joined together;

FIG. 4 is a top plan view of the sheets after the same have been deformed but before the sheets have been shifted or longitudinally moved with respect to each other;

FIG. 5 is a sectional view as seen on lines 5—5 of FIG. 4;

FIG. 6 is a top plan view similar to FIG. 4 after the sheets have been longitudinally moved or shifted with respect to each other to interlock the sheets;

FIG. 7 is a sectional view as seen on lines 7—7 of FIG. 6; and

FIG. 8 is a top view of the lower deformed sheet.

In FIG. 1, two sheets of material 10 and 12 are shown being dispensed from a pair of rolls 14 and 16 respectively. A plurality of splices or joints 18 have been formed between the two sheets of material 10 and 12 by a conventional strip joining press which is generally designated by the reference numeral 20 and is merely illustrated in FIG. 1 to show the relationship of the press to the joints 18 and the two rolls of material.

Press 20 includes an upper die half 22 and a lower die half 24 which are movable towards each other to form the joints 18 in the sheets 10 and 12. The upper die half 22 includes a female element 26 while the lower die half 24 includes a male element 28.

The die half 24 and die half 22 are moved towards each other thereby causing sheets 10 and 12 to be sheared and deformed according to the design of the die halves which produces the joint 18. For purposes of description for each of the joints 18, sheet 10 is deformed to define opposite sides 30 and 32 which are parallel to the longitudinal axis of the sheet. A tab 34 extends laterally from side 30 and is defined by shoulders 36, 38 and side edge 40. Side 32 is provided with a rectangular notch 42 defined by shoulders 44, 46 and side edge 48. Sheet 12 is deformed to define opposite sides 50 and 52 which are parallel to the longitudinal axis of the sheet. A tab 54 extends laterally from side 50 and is defined by shoulders 56, 58 and side edge 60. Side 52 is provided with a rectangular notch 62 defined by shoulders 64, 66 and side edge 68.

The deforming of the sheets 10 and 12 also causes various notches and shoulders to be formed in the sheets adjacent to the joints 18. For purposes of description, sheet 10 will be described as having shoulders 70 and 72 which are complementary to shoulders 36 and 38 respectively. Sheet 10 also has a pair of shoulders 74 and 76 formed by the shearing operation which are complementary to shoulders 44 and 46 respectively. The shearing of sheet 12 causes shoulders 78 and 80 to be formed opposite shoulders 56 and 58 respectively and shoulders 82 and 84 to be formed opposite shoulders 64 and 66 respectively.

The shearing of the sheets 10 and 12 causes shoulders 44, 64, 74 and 82 to be formed and positioned in a vertical alignment as illustrated in FIG. 5. The shoulders 46, 66, 76 and 84 are also formed during the shearing operation and these shoulders are also vertically aligned as seen in FIG. 5. As previously stated, FIG. 5 illustrates the relationship of the various shoulders, tabs and notches prior to the sheets being shifted with respect to each other. FIG. 7 illustrates the relationship of the various shoulders, tabs and notches after the sheets have been shifted with respect to each other. The sheets are shifted with respect to each other inasmuch as there will be a pull on sheet 12 and a certain amount of tension or drag on sheet 10 which will cause the sheet to be moved from the position of FIG. 5 to the position of FIG. 7 with respect to each other. The shift-
ing of the sheets causes the joining of the sheets at each of the joints 18. After the sheets have been shifted, shoulder 64 will be positioned longitudinally of shoulder 44 and positioned below the sheet 10 while shoulder 66 will be positioned longitudinally of shoulder 68 and above sheet 12. The shifting of the sheets also causes shoulder 82 on sheet 12 to be moved longitudinally with respect to shoulder 74 on sheet 10 while shoulder 84 will also be moved longitudinally with respect to shoulder 76. Thus, after the sheets have been shifted, tab 34 will be positioned over shoulder 70 while tab 54 will be positioned above shoulder 38 to prevent separation of the sheets. The same is also true at the opposite side of the joint wherein the tab in sheet 10 between shoulders 74 and 76 will be partially positioned below the shoulder 64. In effect, the shifting of the sheets with respect to each other causes the tabs to be positioned above and below various shoulders thereby locking the sheets together to prevent any possible separation thereof. The sheets will be even more securely joined if a greater amount of tension is exerted on the sheets so it is virtually impossible to separate the sheets. Thus it can be seen that a method has been described for joining sheets together which is relatively simple but extremely efficient and foolproof. Thus, it can be seen that all of the objectives of this invention have been accomplished.

We claim:

1. The method of bonding a pair of sheets of material together, comprising,

   simultaneously shearing and deforming a portion of material out of each of a pair of stacked sheets, said sheared and deformed portion each including opposite sides which are parallel to the longitudinal axis of the sheets, one of said sides having a tab portion extending therefrom, the other of said sides having a notch formed therein, a tab portion being formed in each of said sheets immediately adjacent said notch, and a notch being formed in said sheets immediately adjacent said tab portions in said sheared and deformed portions, said notches being defined by opposite shoulders having a side edge extending therebetween, said tab portions being defined by opposite shoulders having a side edge extending therebetween, said shoulders being transversely disposed to the longitudinal axis of the sheets, and longitudinally moving said sheared and deformed portions to interlock and to bond said sheets together, said sheets being interlocked by means of the shoulders of one of the tab portions of the sheared and deformed portions on one of said sheets being moved longitudinally over the shoulders of the notch in the other of said sheets, and by means of the shoulders of one of the tab portions on said one of said sheet members being moved longitudinally under the shoulders of the notch in the sheared and deformed portion of the other of said sheets.

2. The method of claim 1 wherein said deformed portions have a portion thereof extending upwardly from said sheets, at least some of said tab portions and notches being spaced above said sheets.

3. The method of bonding a pair of sheets of material together, comprising the steps of:

   simultaneously providing individual, generally longitudinal slits in each of a pair of stacked sheets and simultaneously deforming a portion of material on one lateral side of each slit out of the plane of a portion of material on the laterally opposite side of said slit, the slits in one of said sheets being aligned with the slits in the other of said sheets; each slit including,

   a pair of longitudinally spaced slit portions which are parallel to the longitudinal axis of the sheets, and

   an intermediate slit portion joining said longitudinally spaced slit portions to define a laterally projecting tab in one of said portions of material and a complementary, laterally projecting notch in the other of said portions of material, the tabs and notches in one of said sheets being aligned with the tabs and notches in the other of said sheets,

   each intermediate slit portion including longitudinally spaced, slit sections extending laterally of said axis; and

   longitudinally moving at least one of said sheets with respect to the other to cause the tabs and notches on said one sheet to be longitudinally disaligned with the tabs and notches of said other sheet to interlock said sheets together.

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