Feb. 8, 1927. 1,617,121

C. KAUFMAN

METHOD OF MAKING STUDS

Filed Sept. 3, 1925

Fig. 1.

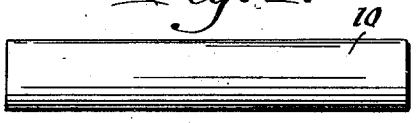


Fig. 2.

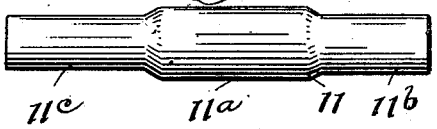


Fig. 3.

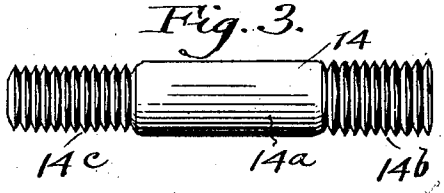
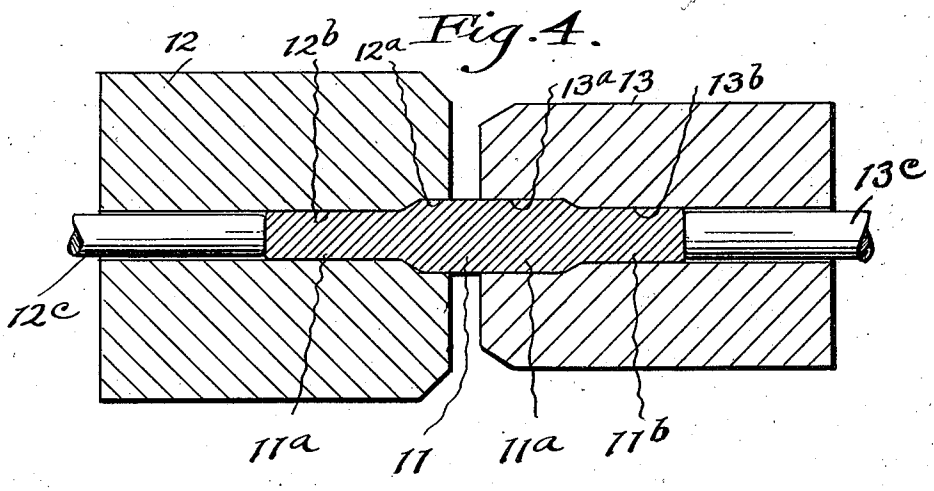


Fig. 4.



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UNITED STATES PATENT OFFICE.

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METHOD OF MAKING STUDS

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This invention relates to a method of making studs and has for its chief object the provision of a method by which more accurate and stronger studs are produced and which is more economical than the commonly employed method of producing them.

Heretofore studs have generally been produced on stud making machines which turn down the stock to the required diameter or diameters and then cut the thread on both end portions. Generally the studs are then heat treated to give them the requisite degree of hardness and strength. This method is not economical, in view of the amount of stock that is wasted in forming the studs and furthermore the studs lack accuracy, for the reason that in the heat treatment the threads are often distorted.

In carrying out the present invention the disadvantages or objections to the commonly employed method are overcome by forming the studs without any wastage of material and without the necessity of heat treatment. In accomplishing these results stock of suitable size is cut to the desired length and is so treated that both its end portions to be threaded are drawn out so as to be reduced to the pitch diameter of the thread to be formed and are, of course, simultaneously lengthened. Next, the threads are rolled on the reduced end portions completing the formation of the studs.

The invention may be further briefly summarized as consisting in the steps of the improved methods that will be described in the specifications and set forth in the appended claims.

In the accompanying sheet of drawings illustrating the manner in which the method is carried out, Fig. 1 shows a length of stock as it appears prior to the treatment. Fig. 2 is a similar view after the end portions have been reduced and lengthened. Fig. 3 is a similar view after the threads have been rolled on to the reduced end portions or of the finished stud and Fig. 4 is a sectional view showing in a somewhat conventional manner dies which may be used in forming the blank of Fig. 2 by reducing and lengthening the stock of Fig. 1.

In carrying out my invention, wire or rod of given diameter and indeterminate length is utilized and preferably cold drawn wire is employed, as it is more accurate in size and gives increased strength, the advantage of which will appear presently. The blanks with reduced end portions and ready for the threading are formed very rapidly in a suitable machine, the stock being fed from a coil or reel to a cut-off mechanism which cuts the stock to the desired length, such as is indicated in Fig. 1, it being understood, of course, that studs of any desired length may be formed.

The cut-off section 10 is then carried over to suitable mechanism which produces the blank 11 of Fig. 2, this blank having a middle portion 11^a and reduced end portions 11^b and 11^c. The relative lengths of the middle portion 11^a and end portions 11^b and 11^c can be anything desired. The diameter of the middle portion 11^a is the same as the diameter of the stock 11, assuming that stock of the right size is employed and the diameter of each reduced end portion is the pitch diameter of the thread to be formed thereon. If both ends are to be threaded alike in so far as the diameter and pitch of the threads are concerned both end portions will be reduced to the same diameter. If one end is to have a smaller thread than the other, such end will be reduced to a smaller diameter, equal to the pitch diameter of the thread to be formed thereon. In this instance the end 11^c is shown in Fig. 2 as reduced to a somewhat smaller diameter than the end 11^b.

In reducing the end portions of the blank a pair of dies are employed forming a part of the machine having the cut-off mechanism, suitable dies being illustrated at 12 and 13. These dies are relatively movable toward and from each other and generally one is fixed and the other movable. The die 12 may be regarded as the fixed die and the die 13 is the movable die. These dies are provided with opposed cavities having outer portions 12^a and 13^a, which in diameter correspond to the diameter of the stock 10 and of the middle portion 11^a of the blank 11 and inwardly of the portions 12^a and 13^a, the die cavities have reduced portions 12^b and 13^b, these corresponding to the diameters to which the end portions 11^b and 11^c are to be reduced; additionally the dies are provided

with adjustable gauges 12^c and 13^c, which determine the lengths of the reduced portions 11^b and 11^c and also serve as ejectors.

From the cut-off mechanism the length of stock is carried over between the dies 12 and 13 into line with the cavities therein and immediately thereafter the dies close and in closing the end portions of the stock are forced into the reduced portions 12^b and 13^b of the die cavities, so as to reduce and lengthen both end portions with an action similar to that in a drawing or extruding process. This completes the formation of blank of Fig. 2, which is ejected from the dies as soon as they move apart.

In this manner the blanks are formed rapidly and with great accuracy and it is an important feature that the reduced portions are hardened by the drawing or lengthening and reducing action of the dies.

In forming the cavities in the dies 12 and 13 it is preferable that the outer or larger portion of the cavity in one die be longer than the corresponding portion of the other die, so that the major portion of the stock which is not reduced in diameter will be received or held in one die cavity. This is illustrated in Fig. 4 wherein the major part of the middle portion 11^a, of the blank is received in the cavity of the die or plunger 13. This arrangement avoids all liability of the stock buckling between the dies and it may be stated at this point that the blanks may be formed in the manner stated without any flashing or other deformation in that part of the stock which forms the middle portion 11^a.

From the blank 11 formed as above described, the finished stud 14, Fig. 3 is produced, the same having an unthreaded middle portion 14^a and threaded end portions 14^b and 14^c. This is preferably done by rolling the threads on the reduced end portions of the blank, which end portions were, as previously stated, reduced to the pitch diameter or diameters of the threads to be formed thereon.

When the threads are rolled on the blanks the studs are completed and ready for use, no heat treatment being required to harden and strengthen them, due to the skin or surface hardening imparted to the blanks by drawing out the end portions in reducing them to the pitch diameter or diameters of the threads to be formed. This is true particularly when cold drawn stock is employed which is somewhat harder and tougher than hot drawn stock.

It will be seen that there is no wastage of material in forming the studs by my improved method and that the studs will be formed accurately and uniformly to the right dimensions, particularly as my method eliminates the necessity of heat treatment which heretofore has frequently warped the threads. Consequently the objects of the invention, to produce better and cheaper studs, are attained.

As already stated, stock of accurate size is preferably employed, this stock corresponding to the diameter of the middle portion of the blank, but my invention can be used substantially as effectively if the stock is slightly over-sized or under-sized. If it is slightly over-sized, the stock will be forced into the outer or larger portions of the die cavities slightly reducing the size of the stock to the extent of the oversize tolerance. If the stock is slightly undersized it will be expanded slightly in the outer portions of the die cavities to form the middle portion 11^a of the blank. Generally, however, as already stated, the diameter of the middle portion of the stock which forms the middle portion 11^a of the blank remains unchanged.

I wish to repeat that the end portions of the stock may be reduced to the same diameter if desired and each reduced end portion as well as the middle portion may have any length desired.

I do not desire to be confined to any particular means or apparatus shown for carrying out the method and aim in my claims to cover all modifications which do not involve a departure from the spirit and scope of my invention.

Having described my invention, I claim—

1. The method of making studs from a length of wire or rod which comprises simultaneously drawing and thereby reducing and lengthening both end portions of a length of stock by forcing said portions endwise into the openings of drawing dies and then forming the threads thereon.

2. The method of forming studs which comprises in one drawing operation lengthening and reducing both end portions of a length of stock to the pitch diameter or diameters of the threads to be formed by forcing said portions of the stock by endwise pressure into the openings of a pair of drawing dies, while maintaining the middle portion at substantially its original diameter and rolling the threads on the reduced end portons.

3. The method of making studs which comprises in one operation drawing out the end portions of a length of stock so that each end portion is reduced to the pitch diameter of the thread to be formed thereon by forcing said portions by pressure exerted endwise on the stock into openings of drawing dies and then forming the threads on the reduced portions.

In testimony whereof, I hereunto affix my signature.

CHARLES KAUFMAN.