

UNITED STATES PATENT OFFICE.

WALTER S. SHIPE, OF BROOKLYN, NEW YORK.

APPARATUS FOR INSERTING, FINISHING, AND SECURING SPOTS IN BOILERS.

SPECIFICATION forming part of Letters Patent No. 521,825, dated June 26, 1894.

Application filed June 19, 1893. Serial No. 478,141. (No model.)

To all whom it may concern:

Be it known that I, WALTER S. SHIPE, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Processes of and Apparatus for Inserting, Finishing, and Securing Spots, of which the following is a specification.

This invention relates to certain new and useful improvements in process of, and apparatus for, inserting, finishing and securing spots in boilers, and has for its object the production of a tight and non-leakable joint between such spot and the boiler, and further to finish such spots so that their internal diameter will in all cases be even and uniform.

To these ends, therefore, my said invention consists in making each spot punch its own hole in the boiler sheet, and placing the edge of the hole so cut in clamping relation to the spot, in one operation, and in coring out the internal diameter of said spot to uniform size, and swaging the same over the boiler sheet, in a second operation, and tools or apparatus for performing such operations, all as hereinafter more particularly described and pointed out in the claims.

Referring to the accompanying drawings, in the several figures of which like parts are similarly designated, Figure 1, is a vertical cross-section, showing the male and female dies, a boiler spot and a fragment of a boiler sheet, just previous to the first operation. Fig. 2, is a similar view, showing the form of plunger or male die I prefer to use for the second operation; and Fig. 3, is a sectional view of a spot inserted in, and secured to, a fragment of a boiler sheet, after the operations have been completed and the spot tapped to receive the pipe connection.

The spot I prefer to use in carrying my said process into effect, is shown and described in a concurrent application, filed by me June 19, 1893, Serial No. 478,140, but I do not desire to limit myself to the use of said spot in practicing this invention, as, obviously, changes and alterations may be made therein, without departing from the principle and scope of my present invention. As shown in said application, Serial No. 478,140, the spot consists of a base flange *a*, provided

with the annular groove *b*, the opposite walls *c*, *d*, of which are reversely inclined or tapered, and a tubular projection *e*. These spots are commonly of soft malleable castings, and usually vary considerably in size, owing to the different degrees of shrinkage, to the lopping of the pattern by different molders, and to more or less of the metal being worn away during the rattling operation, and in practice the holes in the boiler sheets are commonly made of a size to fit the larger castings, and are consequently too large to make a tight fit with the smaller spots.

To insure an absolutely tight joint, and make the hole of proper size to receive its spot, I make each spot punch its own hole through the sheet, and I accomplish this in the following manner, reference being had to Fig. 1, wherein *f*, is a female die having a central opening *f'*, of a size to admit the plunger to be used, and having also a concentric circular depression or recess, within which the base flange *a*, of the spot rests, which prevents the metal thereof from spreading or tearing, during the subsequent operations, and also assists in making a sharp angle in the boiler sheet, as hereinafter explained. On the top of projection *e*, of the spot, I now place the boiler sheet *g*, in the location where it is desired to insert the spot, and subject said sheet to the action of the plunger or male die *h*, which is provided with the annular recess *i*, preferably a trifle wider at the top than elsewhere, and adapted to admit the walls of projection *e*, of the spot. The said plunger has also an annular cutting and forming edge *j*, and the nose or projection *k*, in advance thereof. As the plunger descends, the nose *k*, first comes in contact with the boiler sheet *g*, over the spot, and imparts to the same a great tensile strain, forcing said sheet at the said point, downward within the spot, in the shape of a hemisphere, as shown by dotted lines, Fig. 1. On account of the strain just described, the sheet *g*, yields readily to the cutting or punching operation, which is performed by cutting edge *j*, of the plunger, and the outside of tubular projection *e*, of the spot, and said strain enables me to punch the heavy sheet over the soft casting of the spot, while the nose *k*, and the hemispherical portion of said sheet within the

sput, brace the walls of projection *e*, preventing them from losing their shape, and being distorted during the shearing operation, while the diameter of the circular punching of sheet *g*, within the sput is so reduced by the nose *k*, that it readily falls out from the upper die upon the up-stroke. As soon as the opening has been punched in sheet *g*, as described, the edge *j*, of plunger *h*, forces the sheet downwardly and into the annular groove *b*, of the sput, imparting to the edge of the circular aperture in said sheet an annular circular depression or flange *g'*, Fig. 2. As stock of the sheet *g*, is taken up in forming the angle g^2 , and thereby draws the edge of the circular aperture in said sheet away from tubular projection *e*, of the sput, said sput would be quite loose in the sheet, were it not for the incline *d*, which compensates for the stock taken up, and also assists in making the sharp angle in the sheet at g^2 . The sput and sheet are now in the condition illustrated in Fig. 2, and are ready for the second operation, which consists in punching or coring out the internal diameter of the sput to a uniform and even size, and in swaging the metal of tubular projection *e*, of the sput within the annular flange or depression *g'*, of the boiler sheet. For this operation I prefer to use the same female die, while the male die *l*, consists of the plunger *m*, the upper portion *n*, of which is outwardly flared or tapered and terminates in the forming or finishing groove *o*. Upon the descent of this die, the plunger *m*, enters the sput and shaves or cuts off all sand and other irregularities resulting from the casting operation, and cores out the diameter of said sput to a uniform and even size. As the die further descends and the inclined portion *n*, of the die *l*, enters the tubular projection *e*, it spreads the metal of the said projection *e*, outward, and the forming or finishing head *o*, coming in contact with metal projection *e*, completes the operation and forces or swages said metal into the annular groove or flange *g'*, of the boiler sheet *g*, leaving the work as shown in Fig. 3, completed, and the sput ready to be tapped to receive the pipe connection. It will be apparent that during this operation, the metal of the sput is prevented from losing its shape by the reinforcement or bracing it receives at various points. The base flange *a*, being confined in the recess of the die *f*, while the plunger *m*, being within the sput, prevents the metal thereof from spreading to the center or losing its shape. It will also be apparent from the foregoing, that I am enabled to have stock of the sput on the outside of the boiler sheet equal in thickness to that upon the inside; that the outer portion of the sput, when finished, forms a circular wall of uniform thickness, and that by swaging the upper part of portion *e*, within the annular depression formed in the boiler sheet, the metal is made more dense than if not so confined, but was allowed to spread,

in which case the circumference of the sput would be liable to split or crack.

As before stated, I do not desire to confine myself to the particular form of sput and tools here shown, and described, the gist of the invention lying in making each sput the die for cutting its own hole in the boiler sheet, and in clamping the metal of the sput around the metal of the boiler sheet, with sufficient metal on both sides of sheet to insure the requisite strength and at the same time be practically flush on the outer surface.

What I claim as new, and desire to secure by Letters Patent, is—

1. The herein described process of inserting and securing sputs in and to boilers, which consists in locating the sput on the boiler sheet, forcing a portion of such sheet within the sput and using each sput as a die to punch its hole in the boiler sheet, and then clamping or swaging the metal of the sput around said sheet, substantially as described.
2. The herein described process of inserting and securing sputs in and to boilers, which consists in locating the sput on the boiler sheet, forcing a portion of said sheet within said sput, punching an opening in the sheet to receive the sput, and then swaging or compressing the metal of the sput around the opening in the sheet, substantially as described.
3. The process of inserting, finishing and securing sputs in boilers, which consists in using each sput as a die to punch its hole in the boiler sheet; then coring out the internal diameter of said sput, and then swaging or compressing the metal thereof around the opening in the boiler sheet, substantially as described.
4. The process of inserting and securing sputs of the construction described, in boilers, which consists in using each sput as a die to punch its hole in the boiler sheet; then forcing the edges of said sheet within an annular groove in the base of said sput, imparting to such sheet an annular angular flange or depression, and then swaging or compressing the metal of the sput into said flange, or depression in the sheet, substantially as described.
5. The process of inserting, finishing and securing sputs of the construction described, in boilers, which consists in using each sput as a die to punch its own hole in the boiler sheet; and forcing the edges of said sheet within an annular groove in the base of said sput, imparting to said sheet an annular angular flange or depression, in one operation, and then coring out the internal diameter of the sput to uniform size and swaging or compressing the metal of said sput into the flange or depression in the sheet, in another operation, substantially as described.
6. In an apparatus for inserting, securing and finishing in boiler sheets, sputs having a base, a groove therein and a tubular projection, the combination of a receptacle for the

base of said sput, and a plunger provided with a cutting or folding edge, an annular recess adapted to contain the walls of the sput, and a projecting nose, substantially as described.

5 7. In an apparatus for inserting, securing and finishing in boiler sheets, sputs having a base, a groove therein and a tubular projection, the combination of an apertured receptacle for the base of said sput and a plunger
10 comprising a circular portion, a flaring or ta-

pering portion, and a forming or finishing groove, substantially as described.

Signed at Brooklyn, in the county of Kings and State of New York, this 16th day of June, A. D. 1893.

WALTER S. SHIPE.

Witnesses:

MORRIS LERENS,
WILLIAM H. G. OSBORN.