

No. 755,718.

PATENTED MAR. 29, 1904.

J. P. SNEDDON.
METHOD OF FORMING BOILER HEADERS.
APPLICATION FILED FEB. 14, 1903.

NO MODEL.

Fig. 1

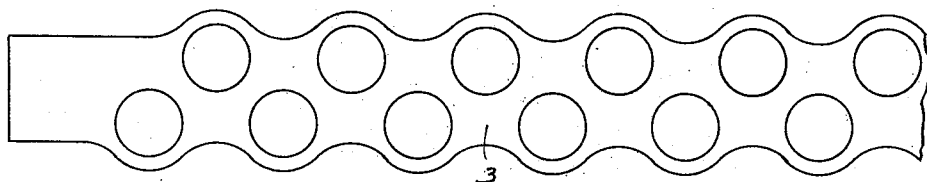


Fig. 2

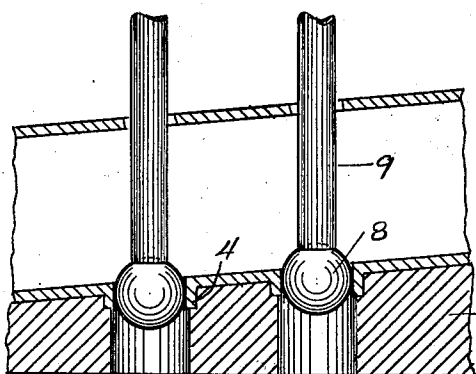


Fig. 3

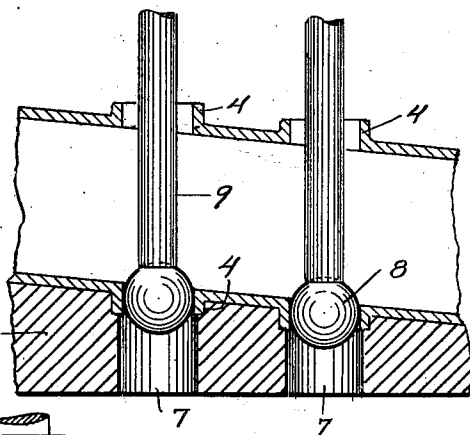
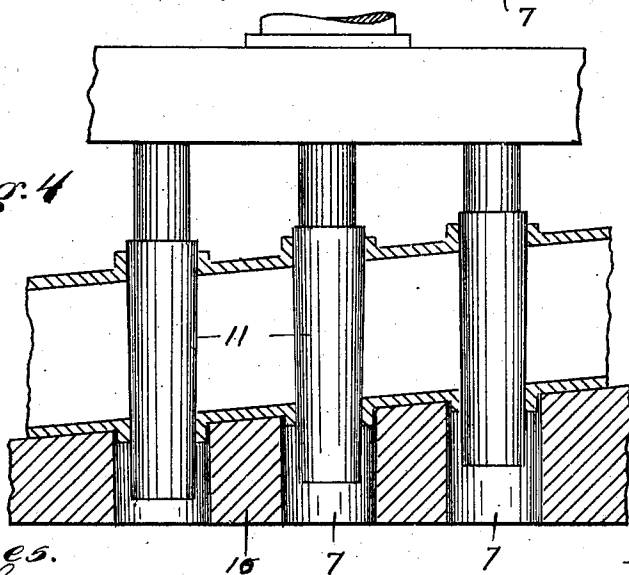


Fig. 4



Witnesses.
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UNITED STATES PATENT OFFICE.

JAMES P. SNEDDON, OF BARBERTON, OHIO, ASSIGNOR TO THE STIRLING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY.

METHOD OF FORMING BOILER-HEADERS.

SPECIFICATION forming part of Letters Patent No. 755,718, dated March 29, 1904.

Application filed February 14, 1903. Serial No. 143,349. (No model.)

To all whom it may concern:

Be it known that I, JAMES P. SNEDDON, a resident of Barberton, in the county of Summit and State of Ohio, have invented a new and useful Improvement in Methods of Forming Boiler-Headers; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to a method of forming hollow or tubular metal articles provided with flanged holes in two opposite side walls thereof, such as wrought-metal headers for Niclausse and similar boilers and the like.

The object of my invention is to provide a method of forming such articles whereby the flanges of oppositely-arranged holes will be perfectly true and in alinement with each other.

In the manufacture of wrought-metal headers for steam-boilers the usual process employed is to take a tube of the desired dimensions and by one or more steps form the same into rectangular shape in cross-section and give it the desired irregular outline longitudinally, the latter preferably consisting in forming transverse corrugations in two opposite side walls of the header, and preferably the corrugations on the opposite walls are arranged alternately, so as to give the shaped tube a staggered or serpentine form. After this shaping of the tube holes are formed in the two opposite flat walls of the header, and then the metal surrounding these holes is turned outwardly to form flanges in order to provide proper seats for the tubes or hand-holds. The flanges of the holes on the two opposite walls of the header are turned outwardly, so that it requires at least two separate operations for flanging all the holes in one header, one operation for flanging the holes in one wall and another operation for flanging the holes in the opposite wall. Inasmuch as the water-tubes of the boiler preferably are in an inclined position, the holes in the opposite walls will not be directly opposite each other, but will be slightly inclined one with reference to the other. Inasmuch as the flanges must be turned so as to be parallel with the axis of the water-tubes, it is necessary during the flang-

ing to support the header upon an anvil or bed having an inclined supporting-face, so that when the flanging-tool is forced down perpendicularly it will give the proper incline to the flanges. As a result two separate and distinct sets of dies must be employed for flanging the holes in the two opposite walls of the header. As a result of these two separate and distinct operations and the two separate and distinct sets of dies the flanges of oppositely-arranged holes are liable not to be in exact alinement with each other. Furthermore, the flanging must be done at a good forging heat, and the shrinking of the metal after flanging is also liable to cause a variation in the alinement of the flanges of oppositely-arranged holes.

The object of the present invention is to provide a method for forming wrought-metal boiler-headers and similar tubular articles having flanged holes in two opposite walls thereof, whereby variation and irregularity in the alinement of the flanges of oppositely-arranged holes is overcome.

To this end the invention consists, generally stated, in forming the wrought-iron tubular article into the desired shape, with holes in opposite walls thereof and flanges around said holes, and thereafter bringing the flanges of oppositely-arranged holes into alinement, such as by forcing a pin or plunger into or through said holes, this preferably being done while the header is cold, so that no subsequent warping or shrinking will take place.

In the accompanying drawings, Figure 1 is a side view of a corrugated tube suitable for forming a boiler-header. Fig. 2 illustrates the flanging of the metal around the holes on one side of said tube. Fig. 3 is a similar view illustrating the flanging of the opposite side, and Fig. 4 illustrates the manner of bringing the flanges of oppositely-arranged holes into alinement.

My invention is applicable to wrought-metal headers or other articles of any preferred shape, providing only they have flanged holes in two opposite walls thereof. In the drawings I have shown the same applied to a corrugated or serpentine wrought-metal

header, this being a form commonly used; but it will be understood that the invention is not limited thereto. The header itself may be formed in any suitable way and by any suitable apparatus—such, for instance, as taking a round tube and at one or successive steps bringing it into the desired cross-section and to the desired longitudinal shape—such, for instance, as making it rectangular in cross-section and providing it with transverse corrugations, as illustrated in Fig. 1. After the tube has been properly shaped holes are formed in the two flat walls 3 of said header, said holes being made in any preferred way, preferably by drilling the same. The header is then reheated and the metal surrounding said holes is turned outwardly to form flanges 4. This flanging can be done in any suitable way and by any suitable apparatus; but preferably the header will be supported upon a suitable anvil or die 5, having openings or recesses 7, corresponding in number, dimensions, and position to the holes in the walls of the tube. The flanges are preferably formed by forcing through the holes suitable implements or projectiles 8, which may be either spheres, half-spheres, section of ellipses, section of cones, or other suitable shape, but for convenience of illustration are shown as spheres. These are forced through the holes in the supported wall of the header by suitable plungers 9, actuated by any suitable mechanism—such, for instance, as a hydraulic cylinder—or, vice versa, the anvil or die 5 may be actuated to secure the same effect. In either event the projectiles will be forced through the holes in the walls of the header and form outwardly-turned flanges thereon. Preferably all of the holes in one wall of the header will be flanged at a single operation, after which the holes in the opposite wall will be treated in the same way. Inasmuch as the water-tubes of the boiler are inclined, the flanges must be inclined with reference to the longitudinal axis of the header, and as a consequence the anvil or bed 5 will be formed with an inclined supporting-face. Separate anvils or beds must be provided for flanging the holes in the opposite walls of the header, inasmuch as said anvils must have their supporting-faces sloping in opposite directions. In Fig. 2 is shown a suitable arrangement of anvil and plungers for flanging the holes in one side of the header and in Fig. 3 a similar arrangement for flanging the holes in the opposite side of the header. During the flanging operation the header will of course be at a good working or forging heat, and usually it will be found necessary to give it two heats, one for flanging the holes in one wall thereof and another for flanging the holes in the opposite wall thereof. In any event there will be two distinct and separate operations for flanging the holes in the two opposite walls, as well as two distinct and separate sets of dies. As a consequence, the

flanges of oppositely-arranged holes are liable not to be in proper alinement, and, furthermore, as the heatings for the two operations are liable not to be exactly uniform there may be variation in shrinkage between the flanges of the two opposite sides, and, furthermore, the shrinkage is liable to cause a slight warping of the flanges. Any variation in the alinement in the flanges in the two oppositely-arranged holes, whether caused by any of the above reasons or for any other reason, I correct by the operation illustrated in Fig. 4. This consists in placing the header upon a suitable anvil or bed 10, having an inclined supporting-face corresponding to the angle of inclination of the flanges, and then forcing into or through the oppositely-arranged holes a tapered plunger or pin 11 of greater length than the cross-section of the header, so that it will simultaneously engage the two holes in the opposite walls of the header by faces which are in exact alinement with each other, thus bringing the flanges of the opposite holes into alinement. This pin may be forced through the holes by any suitable mechanism, but preferably by a hydraulic press. The effect of this is to bring the flanges of oppositely-arranged holes into true alinement with each other, and inasmuch as the operation preferably takes place when the header is cold there will be no subsequent shrinking or warping which will affect the alinement of the flanges.

The mode of carrying out my method will be readily understood from the foregoing description, and it will also be readily understood that by means thereof the headers or other tubular articles will have the flanges of oppositely-arranged holes in exact alinement with each other.

While I have shown and described my invention more particularly with reference to the formation of corrugated or serpentine boiler-headers, I wish it understood that it is not limited thereto, as it is equally as well applicable to the formation of boiler-headers of any other shape than corrugated or serpentine, such as plain rectangular headers, as well as tubular articles of other kinds than boiler-headers, but having oppositely-arranged flanged holes therein. It is also applicable to the formation of boiler-headers or other tubular articles wherein the flanges surrounding the holes therein are perpendicular to the axis of the article instead of inclined with reference thereto.

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

1. The method of making wrought-metal headers and other tubular articles, which consists in forming a wrought-iron tube into the desired shape with holes in opposite walls thereof and flanges around said holes, and thereafter bringing the flanges of oppositely-arranged holes into alinement by forcing into

said holes in such manner as to engage the flanges of both holes simultaneously, means provided with two faces in exact alinement with each other.

5 2. The method of making wrought-metal headers and other tubular articles, which consists in forming a wrought-iron tube into the desired shape with holes in the opposite walls thereof and flanges around said holes, and then forcing a pin or plunger of greater length than the cross-section of the article into oppositely-arranged holes and bringing the flanges thereof into alinement.

3. The method of making wrought-metal headers and other tubular articles, which consists in forming a wrought-iron tube into the desired shape with holes in opposite walls thereof and flanges around said holes, and then when cold forcing a pin or plunger of greater length than the cross-section of the article into oppositely-arranged holes and bringing the flanges thereof into alinement.

5 4. The method of making wrought-metal headers and other tubular articles, which consists in forming a wrought-iron tube into the desired shape with holes in opposite walls thereof, forming flanges around the holes in one wall thereof, thereafter forming flanges around the holes in the opposite walls thereof, and then while cold bringing the flanges of oppositely-arranged holes into alinement

by forcing into said holes in such manner as to engage the flanges of both holes simultaneously, means provided with two faces in exact alinement with each other.

5. The method of making wrought-metal headers and other tubular articles, which consists in forming a wrought-iron tube into the desired shape with holes in opposite walls thereof, forming flanges around the holes in one wall thereof, thereafter forming flanges around the holes in the opposite wall thereof, and then forcing a pin or plunger of greater length than the cross-section of the article through oppositely-arranged holes and bringing the flanges thereof into alinement. 45

6. The method of making wrought-metal headers, which consists in forming a wrought-iron tube into the desired cross-section and with transverse corrugations on two opposite walls thereof and holes in the two remaining walls thereof, flanging the metal surrounding said holes, and then forcing a pin or plunger of greater length than the cross-section of the header through oppositely-arranged holes and bringing the flanges thereof into alinement. 50

In testimony whereof I, the said JAMES P. SNEDDON, have hereunto set my hand.

JAMES P. SNEDDON.

Witnesses:

E. E. BAKER,
J. C. FRANK.