

No. 647,470.

Patented Apr. 17, 1900.

W. M. BROWN & G. H. McFEATERS.
JOINT FOR METAL ARTICLES.

(No Model.)

(Application filed Aug. 24, 1899.)

2 Sheets—Sheet 1.

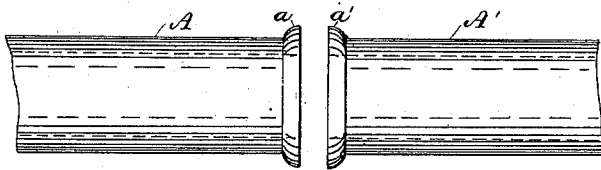


Fig. 1.

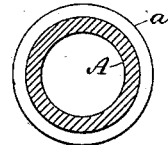


Fig. 2.

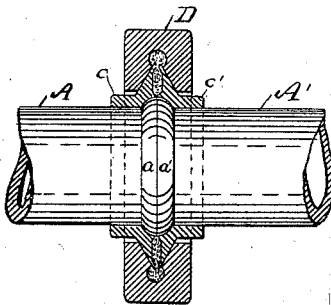


Fig. 3.

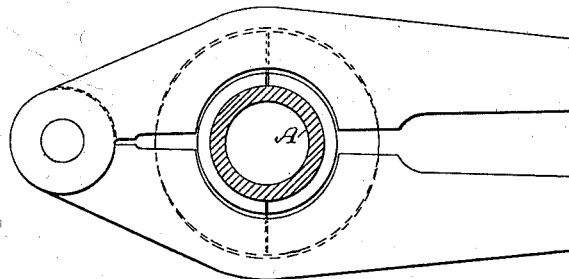


Fig. 4.

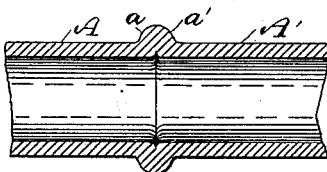


Fig. 5.

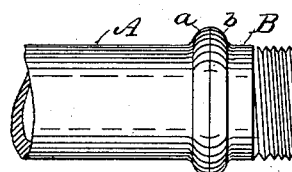


Fig. 6.

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2 Sheets—Sheet 2.

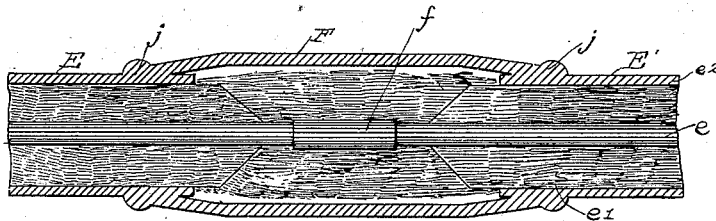


Fig. 7.

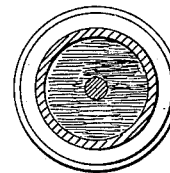


Fig. 8.

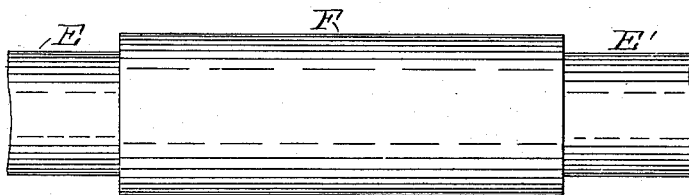


Fig. 9.

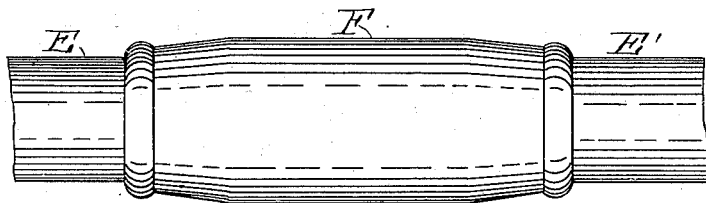


Fig. 10.

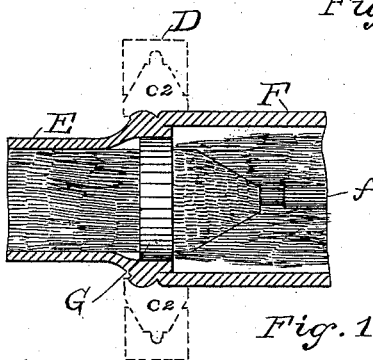


Fig. 11.

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UNITED STATES PATENT OFFICE.

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JOINT FOR METAL ARTICLES.

SPECIFICATION forming part of Letters Patent No. 647,470, dated April 17, 1900.

Original application filed May 5, 1899, Serial No. 715,678. Divided and this application filed August 24, 1899. Serial No. 728,380. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM MILT. BROWN and GEORGE H. McFEATERS, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented a new and useful Improvement in Joints for Metal Articles, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

This invention has relation to a novel joint for metal articles, and provides a joint by means of which various metal articles may be quickly and permanently united in a highly-desirable and practical manner and without the assistance of the skilled labor ordinarily required for such work.

Our novel joint may be used to connect together lead pipes or the lead covering of two cables or tin pipes or lead and tin, or either lead or tin to any other metal—such, for example, as brass—which may be provided with a tinned surface. We do not mean to say, however, that our invention is limited to the specific applications we have mentioned, as doubtless the joint may be used for connecting together many other metals. It will thus be seen that our invention has a wide application; but we know it to be specifically of great value when used to replace the wiped joint, which is ordinarily used in all plumbing connections and for the connecting of lead-covered electric cables.

The process by which our improved joint is constructed is fully described and claimed in our pending application, Serial No. 715,678, of which the present application is a division. The important steps of that process consist in applying a coating of mercury to the surfaces to be united and then applying heat and pressure. We prefer to apply a drop of mercury to the surface and then spread the mercury over the surface by any suitable means, so that a thin film of mercury may be left on the surface. We also prefer to apply the heat to the surface from heated dies (the ordinary heat given a soldering-iron has been found very satisfactory) and to apply the pressure to the heated dies. The effect of the mercury

seems to be (probably from its amalgamation with the other metal) to cause a very thin film of metal at the surface to melt or soften at an abnormally low temperature, so that when pressure is applied the two surfaces are readily united without softening the main body of the metal. When, however, the joint has been completed, the metal remaining at the joint will not melt or soften at any lower temperature than that at which the metal will ordinarily melt or soften, the low-melting metal having been apparently substantially removed at the time of making the joint. The resultant joint is, we believe, a perfect weld between the two articles, the metal forming the joint not being different from that throughout the body of the structure.

The present invention consists in the novel joint so formed and also in the novel construction and combination of parts, all as hereinafter described, and pointed out in the appended claims.

Referring to the drawings, Figure 1 represents a pair of lead pipes about to be joined together; Fig. 2, a section through one of these pipes, and Fig. 3 a longitudinal section of a joint just being completed. Fig. 4 is an end view (the body of the pipe being in section) of Fig. 3. Fig. 5 is a longitudinal section of the completed joint. Fig. 6 illustrates a completed joint between a lead pipe and a brass fitting. Fig. 7 is a longitudinal section of a joint between two lead-covered electric cables, and Fig. 8 a section therethrough. Fig. 9 is a side elevation of the joint of Fig. 7 before the heat and pressure have been applied, and Fig. 10 a similar view of the completed joint. Fig. 11 is a section illustrating a slightly-modified joint in process of being united.

A A' represent two ordinary lead pipes, each of which have had their ends flared outwardly to form collars or flanges *a a'*. This may be done in many ways known to the art, the particular method of forming the collars being immaterial to our present invention. We prefer to have these collars, as it affords a ready means, as will be seen hereinafter, to apply pressure through heated dies to the

surfaces to be connected and also increases the area of the united surfaces. They are not, however, indispensable to the practice of our invention, even for the connecting of
 5 pipes. The opposing faces of the flanged pipes A and A' are now coated with mercury. This may readily be done even when the pipes are at not very accessible positions by carrying drops of mercury on a metal pencil and
 10 transferring it therefrom to the end of the pipe, the drops being spread over the surface in any suitable manner, as by the said pencil or even by the finger of the operator. This leaves a thin film of mercury on the surface.
 15 The amalgamating may be hurried somewhat by first applying a "soldering-acid" to the lead surfaces.

C C' represent two pairs of dies which have been heated in any suitable manner to the
 20 required temperature. We have generally in practicing our process heated the dies after they are in place, their heat being gained by contact with the heated jaws of the compressing-tool. Of course either the tool or dies
 25 might be heated from an outside source, this being merely a matter of preference. Each die is semicircular and embraces the end of one of the pipes, engaging the flanges thereof. The periphery of each die is partially inclined, so that when the dies are in position
 30 the jaws D of the compressing-tool will engage oppositely-inclined die-surfaces and move the dies toward each other, pressing the ends of the pipes together. In making a
 35 joint with ordinary house-pipes—say one inch in diameter—we ordinarily apply the heat from the compressing-tool through the medium of the dies for about one minute. During this period we keep a gentle pressure on
 40 the jaws of the tool, and at the end of that time we increase the pressure and then remove the tool and dies. The heat should not be great enough to melt or materially soften the metal, except where amalgamated, if the
 45 best results are to be obtained. The particular arrangement of dies and compressing-tool is not claimed by us in the present application, but forms in part the subject-matter of another application filed by us on May 5, 1899,
 50 Serial No. 715,679.

Fig. 6 illustrates a completed joint between pipe A and a brass fitting B. In this case the fitting is formed (by casting or otherwise) with the flange or collar b. The surface of
 55 the flanged fitting B is tinned, the mercury applied in the manner already described to the tinned surface of B and the surface of pipe A, and the process may then be practiced as already described.

60 Referring now to Sheet 2 of the drawings, which illustrates another use of our improved joint, E and E' represent two lead-covered cables, each comprising the copper conductor e, the insulation e', and the lead covering e².
 65 The insulation and lead covering may be removed from the ends of the two cables, the

insulation tapered, (as indicated by the lines in Fig. 7,) the ends of the copper conductors connected by a sleeve f, and insulation placed
 70 about the sleeve. These are the ordinary steps for connecting cables by wiped joints. A lead sleeve F may then be connected by our process to the ends of the lead covering of the cables, joints being shown at j, Fig. 7. It will of course be obvious that the mercury
 75 will have been applied to the interior of the ends of the sleeve F and the said sleeve slipped over the end of one of the cables before the conductors e have been connected by sleeve f.
 80

In Fig. 7 we have illustrated a modified form of joint for electric cables, in which a metal ring G is slipped over the insulation and under the lead covering of the cable, so
 85 as to form an internal die. This relieves the insulation and allows of obtaining a more effective pressure at the surfaces to be united. In this figure we have shown the dies C² and the jaw D of the compressing-tool. It is obvious that in this case the pressure desired
 90 is in a radial direction and not in a longitudinal direction, and therefore the dies are shown adapted for radial movement.

From the foregoing description it will be obvious that our process has a wide range of
 95 action, and our improved joints may be of many different specific types, and we do not therefore limit ourselves to the specific embodiments of our invention nor to those details of the process which we have described
 100 merely for the purpose of fully explaining the preferred way of carrying out the process, but which are not essential to our broad invention.

We do not herein specifically claim the
 105 joints shown in Figs. 7, 8, 9, 10, and 11, as the same form the subject-matter of a separate application of even date herewith.

Having thus described our invention, what we claim, and desire to protect by Letters Pat-
 110 ent, is—

1. The improved metal joint consisting of abutting portions of a pair of articles joined together by originally-amalgamated surfaces thereof.
 115
2. An article of manufacture consisting of a metallic piece adapted for connection to another article and having that portion of its surface which is to form the joint coated with mercury, substantially as described.
 120
3. As a new article of manufacture, a metal pipe having an end flange adapted to abut a similar portion of a second pipe, and a coating of mercury on said flange, substantially as described.
 125
4. The herein-described joint for metallic articles, consisting of contacting portions of said articles homogeneously united by amalgamated surfaces thereof.
5. As a new article of manufacture, a metal
 130 joint consisting of a pair of articles having enlarged abutted portions united by origi-

nally-amalgamated surfaces thereof, substantially as described.

6. As a new article of manufacture, a metal pipe having an end surface of a nature to
5 form an amalgam, and having such surface coated with mercury, substantially as described.

7. The herein-described pipe-joint, consisting of the abutted flanged pipe ends united

by originally-amalgamated surfaces thereof, 10 substantially as described.

In testimony whereof we have affixed our signatures in presence of two witnesses.

W. MILT. BROWN.

GEORGE H. McFEATERS.

Witnesses:

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H. W. SMITH.