

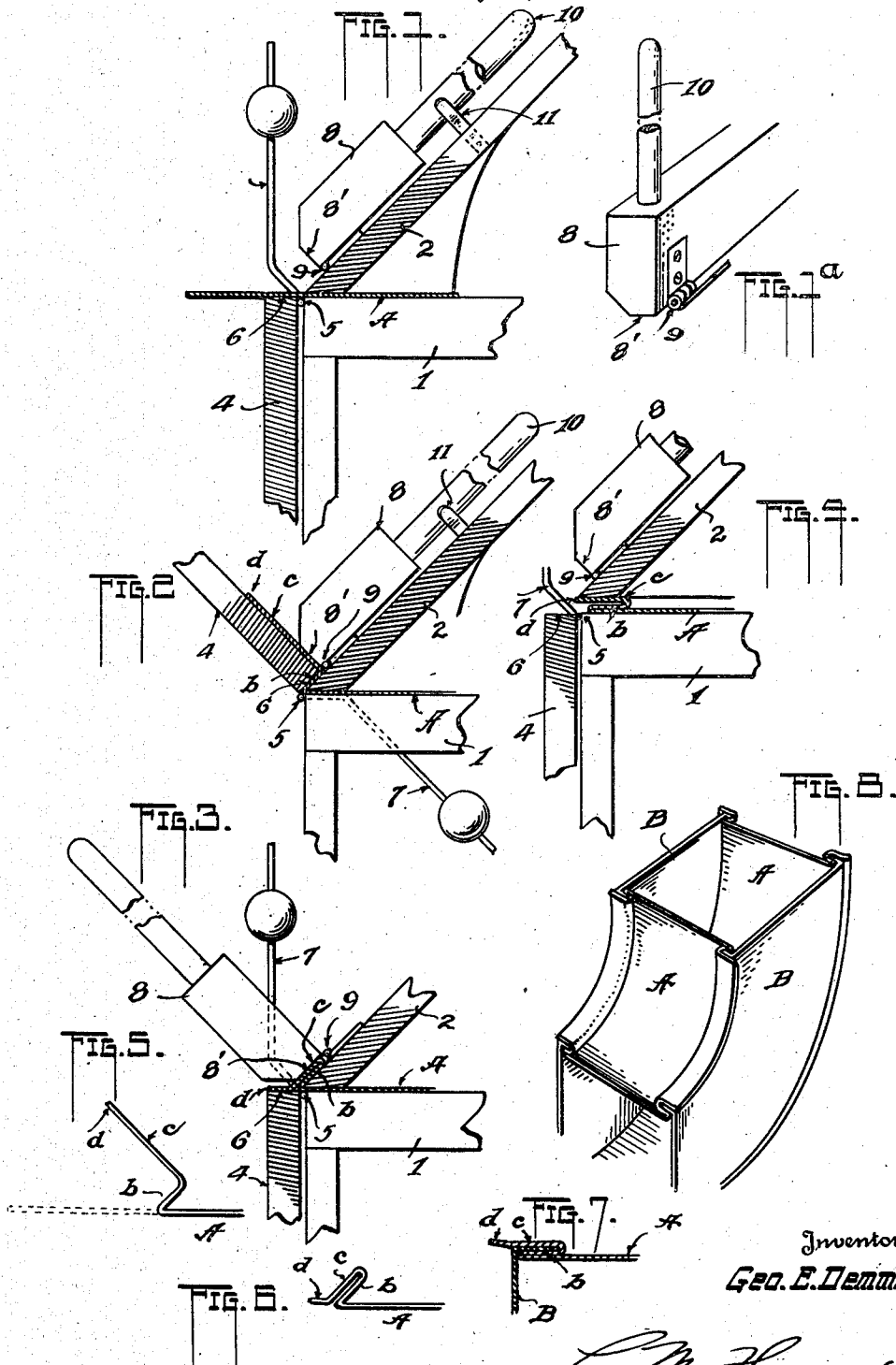
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APPARATUS FOR USE IN FORMING PITTSBURGH JOINTS

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APPARATUS FOR USE IN FORMING PITTSBURGH JOINTS

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8 Claims. (Cl. 153—16)

This invention relates to apparatus for forming so called "Pittsburgh joints", said invention contemplating a special machine constructed for the named purpose, or an attachment to the well known "brake" employed in sheet-metal-bending operations.

The main object of the invention is to provide an apparatus for sheet metal bending by which the steps of forming "Pittsburgh joints" will be greatly simplified through eliminating much hand work and complicated handling, and by which the finished work will be more perfect in form and may more easily and readily receive companion members employed therewith in constructing various elbow conduits and the like well known in sheet metal working.

Another object is to provide a simple attachment for any ordinary "brake" by which the named type of "joint" may be readily produced while reducing many laborious handling operations.

That the invention may be fully understood the appended drawing is provided wherein:

Figure 1 is a transverse sectional elevation of parts of an apparatus involving my invention showing an inserted sheet metal part as the work to be acted upon.

Figure 1^a shows in perspective part of an abutment member illustrated in Figure 1.

Figure 2 is a similar to Figure 1 showing one of the parts of the apparatus in a different position for acting upon the inserted work.

Figure 3 corresponds to the earlier figures, particularly Figure 1, wherein a part of the apparatus involved in the invention is shown as having been manipulated for acting upon the work.

Figure 4 corresponds to Figure 1 with the work in a different position after being acted upon for applying pressure thereto as a finishing operation.

Figures 5, 6 and 7 show the various forms of the work resulting from operations thereon and correspond in the order given with the work as treated shown in Figures 2, 3 and 4 respectively, and

Figure 8 illustrates in perspective a sheet metal elbow merely to best give an understanding of the use of the type of joint herein named.

Sheet metal workers are familiar with the many tedious operations necessary in forming a joint by hand and the more or less imperfectly finished product, as well as the considerable amount of time required to turn out a given piece of work.

It is with this view that the apparatus now

to be described has been provided whereby the joint may be quickly, easily and perfectly provided.

In order to make the invention readily understood the essential parts of a "brake" of any ordinary type are herein illustrated, the same being shown in transverse section, wherein 1 designates a support such as a part of a bench or table to receive upon its top surface the work to be acted upon indicated at A, 2 representing a member known as a "bending rail", this usually lying at an angle of substantially 45° to the top surface of said bench 1 which by means of suitable guides and operating means not shown, is raised and lowered as employed to clamp work upon said bench.

At 4 is a bending leaf or apron hingedly attached to the bench at 5 and when suspended as shown in Figures 1, 3 and 4 having one of its surfaces 6 flush with the top surface of said bench, 7 being the usual weighted balancing arm for the said bending leaf or apron.

Hingedly mounted upon the front face of the bending rail 2, as the novel part herein, is a machine for the purpose of forming joints, in a bar 8 which shall be termed herein an abutment member, this being of any length desired, the form thereof in cross section being substantially as illustrated in the figures, part of said member likewise being shown in perspective in Figure 1^a. The mounting for said member may be, for example, one or more hinges one of which is indicated at 9 by which it may be mounted upon said bending rail 2. The point of the hinge 9 at the rail 2 and the surface 3' of the member is spaced a short distance from the plane of the bench top, being in this instance a distance about equal to the thickness of the apron 4 plus the thickness of the work A, said member being spaced from the rail 2 a distance, also, slightly greater than a double thickness of said work as will be understood later.

The member 8 is formed with an operating handle 10, and a suitable spring friction device at 11 may be affixed to the rail 2 to engage the handle to maintain the member normally in the position shown in Figures 1, 2 and 4.

To form a "Pittsburgh joint" it is required, of course, that a metal sheet at its edge must be twice folded upon itself in the form of a Z, and this usually somewhat difficult operation is quite simply produced on the machine or apparatus as herein appointed.

In the practical operation the work is clamped upon the bench 1 by the named bending rail 2

with sufficient stock projecting across and beyond the apron 4 to provide the final result. The work having been properly adjusted and clamped the projecting portion is now acted upon by
 5 upwardly swinging the apron 4, Figure 2, whereupon, the work is given an arcuate angular bend *b* over the margin of the rail 2, and said apron then reaching a position at right angles to the plane of said rail 2, and at the same operation
 10 by crowding the work between itself and the abutment member 8 bends said work to form the extension *c*, the said member 8 thus constituting an abutment for the purpose. The apron may now be returned to its normal pendant position,
 15 whereupon the member 8 is swung forward to substantially the position shown in Figure 3, its end surface 8' carrying the said extension *c* over upon the initial bend *b*, any portion, as *d*, extending beyond the said initial bend *b* being
 20 forced upon the face 6 of the apron 4 and, caused to take up a slight angle to said extension *c*.

It is now apparent that the abutment member 8 if spaced sufficiently from the rail 2 will admit of two thicknesses of the work to lie between said member and said rail and the spacing may be
 25 more or less as desired, sufficient space being permitted, however, to admit of the entrance of companion member between *b* and *c* employed in creating a conduit within an elbow, see Figures
 30 7 and 8, or other forms.

Having created the single fold shown in Figures 3 and 6 the work is now placed between suitable clamping devices such, for example, as the rail 2 and table 1, see Figure 4, and the whole collapsed
 35 into the Z form. And upon removal of the work from the clamping arrangement the extension *d* will take up a slightly angular position with respect to *c*, see Figure 7, and act as a guide for the named companion portions of the said elbow or
 40 other conduit structure to be created.

It is noted that the extension *d* is bent at a slight angle to *b*, *c* in producing the folded portion in Figure 3 by being forced upon the apron 4, retaining that relation even under pressure of
 45 the rail 2 in Figure 4 as evidenced in Figure 7. That is to say, the pressure of the rail in collapsing the folds *b*, *c* does not necessarily occasion any change in the angle of *d*, that portion springing back to its angular position after pressure is
 50 removed.

Figure 8 illustrates part of a conduit in the form of an elbow, in line with the last above, wherein the parts A each operated upon as herein described at each of its edges and afterward bent
 55 into curved form for elbow purposes, not new herein, and receive side members B, B forming a complete conduit structure.

While the plane of the working face of the bending rail 2 may have any other angle with respect to the top surface of the bench 1 an obtuse angle such as shown is preferable since the work
 60 in the form shown in Figures 3 and 6, whose bends *b* and *c* lie at an acute angle to the bench surface is in better position to receive pressure thereon for collapsing purposes, it being always preferable, of course, that the work approach as
 65 much as possible a Z-form in order that pressure may be more easily applied thereto.

Again, the various elements of the machine structure may have positions, relatively, other than those shown as long as the several operations upon the work provide the results required
 70 upon such work in producing the final completed forms shown.

75 While the invention contemplates a type of

apparatus wherein the apron is hingedly mounted as herein, said apron may perhaps be otherwise disposed and operated while free to crown the work into the angle formed at the working faces
 5 of the rail and abutment member. Thus it is not the purpose to be confined to the exact means shown for operating upon the work.

I claim:

1. In apparatus for bending sheet metal in forming "Pittsburgh joints" including a support
 10 to receive the work, means to clamp the work upon said support, including a rail to receive upon a face thereof part of the work, an apron hingedly mounted adjacent the support, and an abutment member hingedly mounted adjacent the
 15 face of the said rail adapted to swing between two positions with respect thereto and having a face adapted to lie normally substantially at right angles to the plane of said face of the rail, said
 20 apron in its hinging action adapted to bend the work toward and against the named faces of the said abutment member and said rail and together with said work fit into the angle made by
 25 said faces, said abutment member in a hinging action thereof adapted upon removal of the apron from said angle to engage the work and double said work upon itself.

2. In apparatus for bending sheet metal in forming "Pittsburgh joints" including a support
 30 to receive the work, means to clamp the work upon said support, including a rail to receive upon a face thereof part of the work, an apron hingedly mounted adjacent the support and having a work engaging surface substantially flush with
 35 the work receiving surface of the support, and an abutment member hingedly mounted adjacent the face of the rail and normally substantially paralleling the latter, a face of the member having spaced relation to the plane of the work engaging face of the apron and that of the support and lying substantially at right angles to
 40 the said face of the said rail, said apron adapted in a swing thereof to lie within the angle formed by said face of the member and that of said rail and to force into said angle an extension of
 45 work mounting on the support, said member adapted in a hinging action thereof to engage the said extension of the work and double it upon itself while abutting upon said rail.

3. Apparatus for bending sheet metal in forming "Pittsburgh joints" including in its construction a support, a member thereon for receiving a
 50 sheet of metal against it, a hingedly mounted bending apron on the support adapted to engage and bend the metal to carry a part thereof upon said member, and an abutment member lying adjacent such member and hingedly mounted
 55 thereon and having a face to receive that part of the metal against it, bent up by said apron, said face of the abutment member in the hinging action of said abutment member adapted to
 60 double said part of the metal upon that part so bent upon the described first member by said apron.

4. Apparatus for bending sheet metal in forming "Pittsburgh joints" including in its construction a member to fix a sheet of metal in position
 65 to be worked upon and for receiving the metal against it, a hingedly mounted bending apron adapted to engage and bend the metal to carry a part thereof against said member, and a hingedly mounted abutment member lying at the first member and having a face disposed adjacent
 70 the work receiving face of said first member, and also adapted to receive part of the metal against

its said face, said face of said abutment member adapted in a hinging action of the latter to double the said part of the metal upon that part lying upon said first member.

5 5. Apparatus of the nature and for the purpose described including a support for a sheet of metal, a rail having a working surface disposed at an angle to the plane of the metal to be processed, a bending apron mounted to swing about the rail and to engage and bend part of the metal over upon the said rail, an abutment portion at said rail mounted to swing and to receive against it an extension of said part of the metal so placed at the said rail, said abutment member having a face adapted to engage and fold the said extension upon and substantially paralleling said part so positioned upon said rail.

20 6. Apparatus of the nature and for the purpose described including in combination with a support having a surface for receiving upon it work to be processed, a bending rail lying adjacent the said surface of the support and also having a working surface, the same being inclined at an acute angle to said surface of the support, and a bending apron adjacent both the surfaces adapted in a movement thereof to engage and bend the work at an acute angle toward the said surface of the rail, an abutment member hingedly mounted adjacent the said surface of the rail and itself having a working face lying normally at an angle to the rail's said surface, said member adapted to receive an extension of the work against its working face in the named action of the apron, and said member adapted in a hinging action thereof to engage and bend said extension over upon that part of the work previously bent toward said rail.

40 7. Apparatus for use in forming "Pittsburgh joints" including a support having a surface for receiving flat upon it a sheet of metal to be fold-

ed, a rail at the support having a surface inclined at an angle to the said surface of the support, a member hinged at the support having a surface substantially paralleling the said surface of the same, said member adapted to fold part of the metal distant from the margin thereof upon the inclined surface of the rail, a hingedly mounted member at said rail, the same having a surface lying normally at an angle to the surface of the rail and also receiving part of the thus folded metal against it in the action of the first named member, said surface in a hinging action of said member adapted to fold the metal lying thereagainst upon that portion of said metal abutting the inclined surface of the rail and to force a free marginal portion of the metal upon the first named member in the normal position of that member.

20 8. In an apparatus for use in forming joints, the combination with a support, a rail cooperating therewith for clamping sheet metal work thereon and having a working surface lying at an obtuse angle to the working surface of the support, and a bending apron hinged to said support having an operating work engaging surface, of an abutment member hingedly mounted in close proximity to said surface of said rail and having a surface disposed in spaced relation to both the hinge line of said apron and the working surface of said support, said surface of said abutment member adapted in the hinging action of the said apron to receive against it a part of the sheet metal work carried by said apron, the latter also carrying part of the work upon the rail adjacent the abutment member, and said surface of said abutment member in the hinging action of that member adapted to be carried to a position substantially parallel to the named surface of the rail to fold the work upon itself at said rail.

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