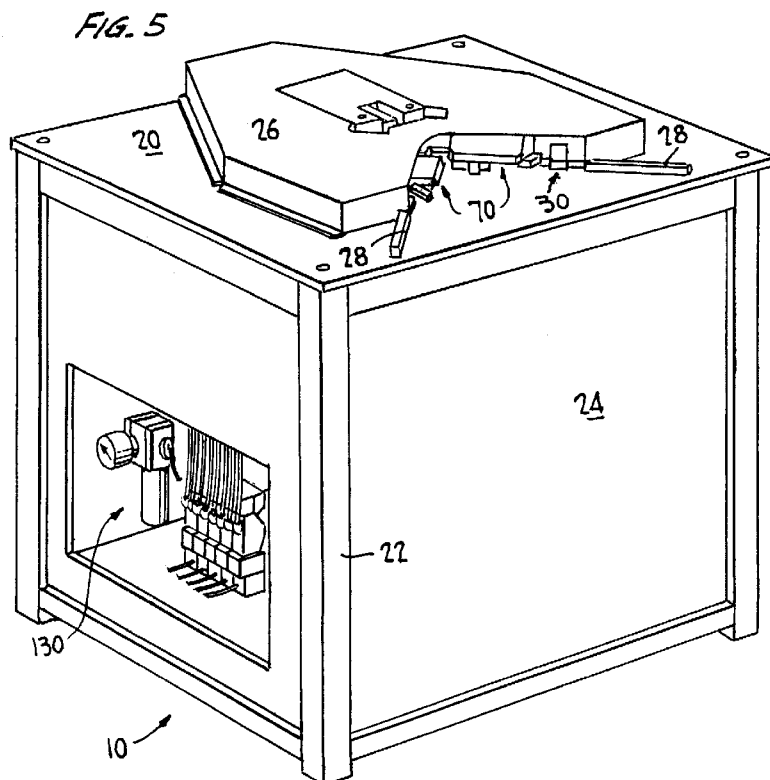




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[Continued on next page]

(54) Title: ANGLED PLATE PLACEMENT IN TRANSVERSE DUCT FLANGES



(57) Abstract: An apparatus and method are described for inserting angle plates in transverse duct flanges. The apparatus is especially useful in inserting angle plates into transverse duct flanges of duct fittings. Packages for holding angle plates are also described.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US14/28057

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B23P 19/00; B23Q 7/10 (2014.01)

USPC - 29/818; 285/412; CPC Classification(s): B21D 39/02, B23P 19/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8): B23P 19/00; B23Q 7/10; B65G 65/30 (2014.01); CPC Classification(s): B21D 39/02, B23P 19/04

USPC: 29/238, 243.5, 251, 252, 451, 525, 701, 709, 809, 818; 221/10; 285/363,368, 405, 412, 424;

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

MicroPatent (US-G, US-A, EP-A, EP-B, WO, JP-bib, DE-C,B, DE-A, DE-T, DE-U, GB-A, FR-A); Google; Google Scholar; ProQuest
Keywords: duct, tube, conduit, pipe, metal, sheet metal, fabricate, manufacture, angle plate, corner, connector, joint, plate, component, machine, tool, assemble, insert, drive, platen, bed, table, bench, surface, clamp, hold, arm, head, finger, pull, straighten, deform, flange,

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — Y	US 5,321,880 A (GOODHUE W. V.) June 21, 1994; figures 2, 6, 9; column 4, lines 45-50	51-56 — 33-42, 46-48, 57-59, 62-64
Y	US 5,283,944 A (GOODHUE W V) 8 February 1994; figures 2-13, 16-18; column 1, lines 10-12, 62-65; column 4; lines 22-28, 37-48, 68 to column 5, line 30, 35-66; column 6, lines 27-54; column 7, lines 32-63; column 8, lines 1-7	1-4, 6-19, 21, 24-32
Y	US 3,786,700 A (KING D P) 22 January 1974; figures 1, 5; column 1, lines 45-50; column 2, lines 35-62	1-4, 6-23, 33-38
Y	US 2009/0212062 A1 (CRAYTHORN R A et al.) 27 August 2009; figure 4; paragraphs [0007], [0009], [0092]	15-19, 26-32, 39-42, 46-48, 57-59, 62-64
Y	US 6,502,716 B1 (KOLEGAR J R) 7 January 2003; figures 8, 10, 12, 13; column 4 line 67 to column 5, line 24; column 6, lines 45-55	26-32
Y	US 7,013,545 B1 (RITCHIE R J) 21 March 2006; figures 1, 4; column 3, lines 29-41, 51-56; column 5, lines 7-30	6, 7, 14
Y	US 2,889,073 A (NOGLE C C) 2 June 1959; figures 1, 3; column 1, lines 42-46; column 2, lines 42-57; column 3, lines 30-70	11, 12
Y	US 5,926,937 A (GOODHUE W V) 27 July 1999; figures 1-3, 5; column 1, lines 11-16, 31-33; column 2, lines 8-12; column 3, lines 39-67; column 4, lines 26-36	20-23

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

22 September 2014 (22.09.2014)

Date of mailing of the international search report

14 NOV 2014

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US14/28057

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

---Please See Supplemental Page---

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US14/28057

-Continued from Box No. III: Observations where unity of invention is lacking-

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: claims 1-32 are directed toward a method of fabricating a duct fitting.

Group II: claims 33-38 are directed toward a method of assembling angle plates.

Group III: claims 39-50, 57-70 are directed toward a package for angle plates comprising: a sleeve adapted to receive in stacked relation a plurality of angle plates.

Group IV: claims 51-56 are directed toward a package of angle plates comprising at least one band.

The inventions listed as Groups I-IV do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons.

The special technical features of Group I include fabrication of a duct fitting at a work station (which is not present in Groups II-IV) and automatically inserting angle plates in said duct fitting (which is not present in Groups III, IV) at said work station, said work station comprising (a) an apparatus for automatically (which is not present in Groups II-IV) assembling an angle plate in channeled shaped flanges at ends of said duct fitting (which is not present in Group II), said apparatus comprising: a platen (which is not present in Groups III, IV) for engaging an end of said duct fitting in a pre-selected position relative to said platen; clamping members for locking said duct fitting in a pre-selected position relative to said platen (which is not present in Groups II-IV); a supply hopper for angle plates located underneath said platen (which is not present in Groups III, IV) for advancing upwardly an angle plate for insertion into said duct fitting; an angle plate advancing member for advancing an angle plate into engagement with a corner of said clamped duct fitting; and pressing members (which is not present in Groups II-IV) for pressing an angle plate into said corners of said duct fitting (which is not present in Groups III, IV); and (b) a table adjacent said apparatus adapted for use by one or more workers (which is not present in Groups II-IV).

The special technical features of Group II include positioning a plurality of angle plates within a supply hopper of an apparatus for automatically inserting angle plates, wherein said supply hopper is located underneath a platen of said apparatus (which is not present in Groups III, IV) and out of the work area; individually feeding an angle plate from the supply hopper; moving each angle plate into contact with a duct corner and generally adjacent to flanges of such duct, and pressing said angle plate into said flanges (which is not present in Groups III, IV).

The special technical features of Group III include a sleeve adapted to receive in stacked relation a plurality of angle plates (which is not present in Groups I, II, IV); said angle plates comprising two legs joined together in angular relation by an integral corner (which is not present in Groups I, II) and adapted to be inserted into said channel shaped duct flanges (which is not present in Group II); said sleeve having at least one closure member at an end thereof; and wherein said sleeve is adapted to fit into said apparatus for automatically assembling an angle plate in channel shaped duct flanges, said sleeve constructed and arranged to provide a V-shaped package, said sleeve including six walls and having longitudinal perforations along each of said walls for forming said finished sleeve, said sleeve having at least one closure member at the bottom of said sleeve and said at least one closure member having lateral perforations along said bottom of said sleeve for forming said finished sleeve (which is not present in Groups I, II, IV).

The special technical features of Group IV include a plurality of angle plates stacked vertically and held together by at least one band (which is not present in Groups I-III); said angle plates comprising two legs joined together in angular relation by an integral corner (which is not present in Groups I, II) and adapted to be inserted into said channel shaped duct flanges (which is not present in Group II); and wherein said package is adapted to fit into said apparatus for automatically assembling an angle plate (which is not present in Groups I-III).

The common technical features of Groups I-IV include: automatically inserting angle plates in said duct fitting; assembling an angle plate in channeled shaped flanges at ends of said duct fitting; a platen; a supply hopper for angle plates located underneath said platen; pressing an angle plate into said corners of said duct fitting; said angle plates comprising two legs joined together in angular relation by an integral corner.

-Continued on Next Supplemental Page-

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US14/28057

-***-Continued from Previous Supplemental Box-***-

These common technical features are obvious over US 5,926,937 A (GOODHUE) in view of US 3,786,700 A (KING). Goodhue discloses automatically inserting angle plates in said duct fitting (the invention relates to a mobile apparatus for and the method of automatically placing (automatically inserting) angle plates (angle plates) into channel flanges of ducts (duct fittings) once a duct is positioned relative to the apparatus; column 1, lines 11-16), assembling an angle plate in channeled shaped flanges at ends of said duct fitting (the invention relates to a mobile apparatus for and the method of automatically placing (automatically assembling) angle plates into channel flanges (channel shaped flanges) of ducts (duct fittings) once a duct is positioned relative to the apparatus (e.g., at ends); column 1, lines 11-16), a platen (duct section 30 (duct) is positioned between left and right guide rails 22 and 24 fixed to base plate 10 (platen); figure 1; column 1, lines 31-33); a supply hopper for angle plates (supply magazine 60 (supply hopper) carries corner plates 62 (angle plates) for insertion into flange 32 of duct section 30 (duct fitting); figures 1-3; column 3, lines 49-55); pressing an angle plate into said corners of said duct fitting (the press head 76 is carried on press arms 78 and 80 and provides an axial component for pressing (for pressing) the corner plate 62 (angle plate) into position in the duct flange 32 (e.g., into said corners of said duct fitting); figures 1, 2, 5; column 3, lines 62-67); said angle plates comprising two legs joined together in angular relation by an integral corner (as shown, corner plate 62 (angle plate) has two legs joined perpendicularly; figure 2). Goodhue does not disclose a supply hopper for angle plates located underneath said platen. King discloses a supply hopper located underneath said platen (magazine 12 and feeding mechanism 13 (supply hopper, collectively) is shown to be located underneath work table 14 (platen) wherein movement of the piston 29 raises the feeding rod 30 vertically transporting (advancing upwardly) the part from the magazine 12 to the finishing position A on the work table 14; figures 1, 5; column 2, lines 35-44; column 3, lines 57-62). In order to automatically position angle plates within duct channel flanges (Goodhue '937; column 1, lines 13-16), it would have been obvious to one of ordinary skill in the art at the time of the invention to install Goodhue's supply hopper below the platen as disclosed by King because the actuation of the bottom-feeding hopper has better control over placement and timing and is more accurate than relying on gravity such as with a top-feeding hopper (King; column 1, lines 45-50; column 2, lines 49-62). Furthermore, where the general conditions of a claim are disclosed in the prior art, a mere rearrangement of parts requires only routine skill in the art, particularly where the use of bottom-feeding hoppers is commonly known in the art for supplying identical elements during fabrication.

Because the common technical features are disclosed by Goodhue and King, in combination, the inventions are not so linked as to form a single general inventive concept. Therefore, Groups I-IV lack unity.