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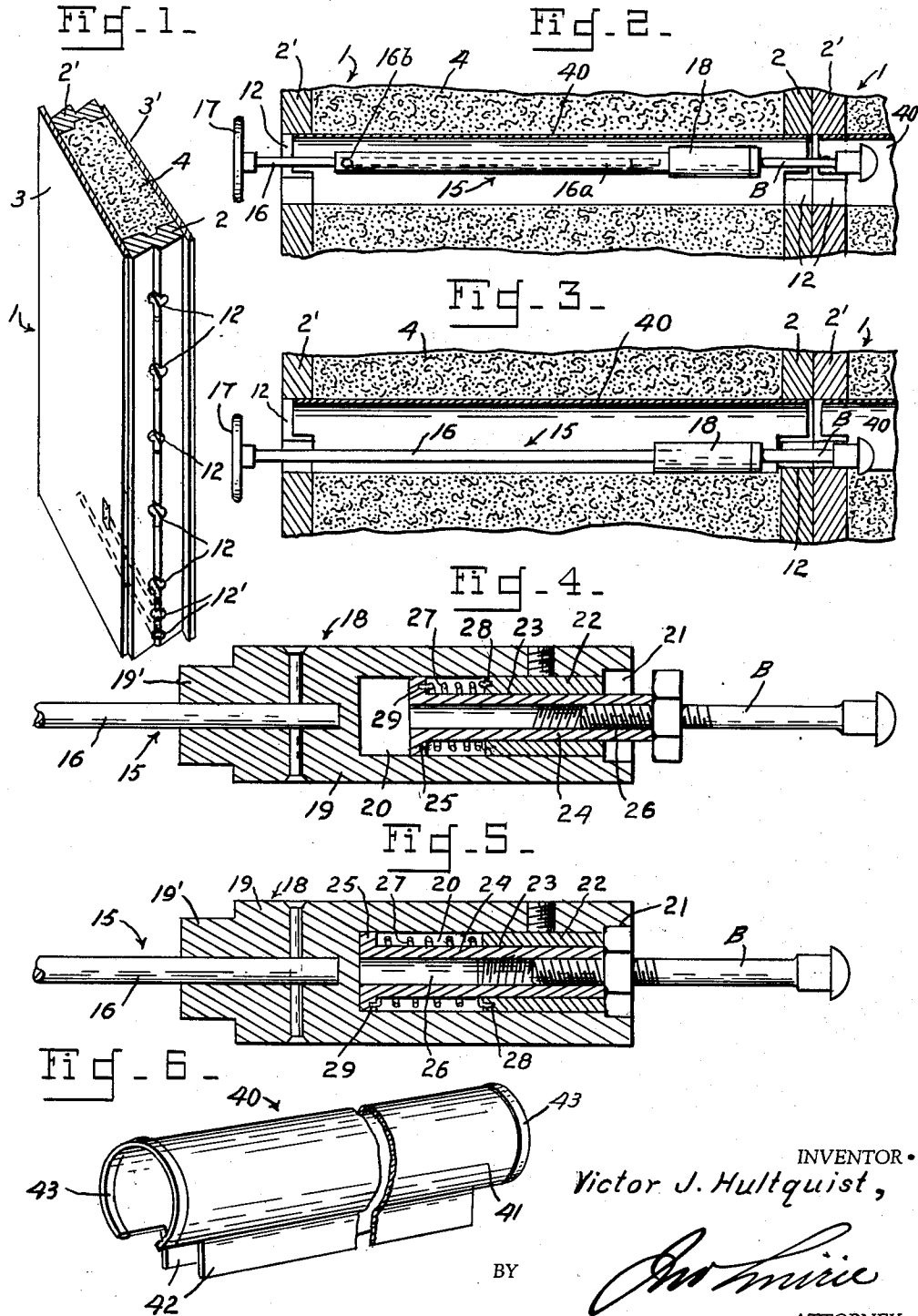
V. J. HULTQUIST

2,661,644

WRENCH COMBINED WITH PUNCH AND ASSEMBLY TOOL

Filed Nov. 13, 1952

2 Sheets-Sheet 1



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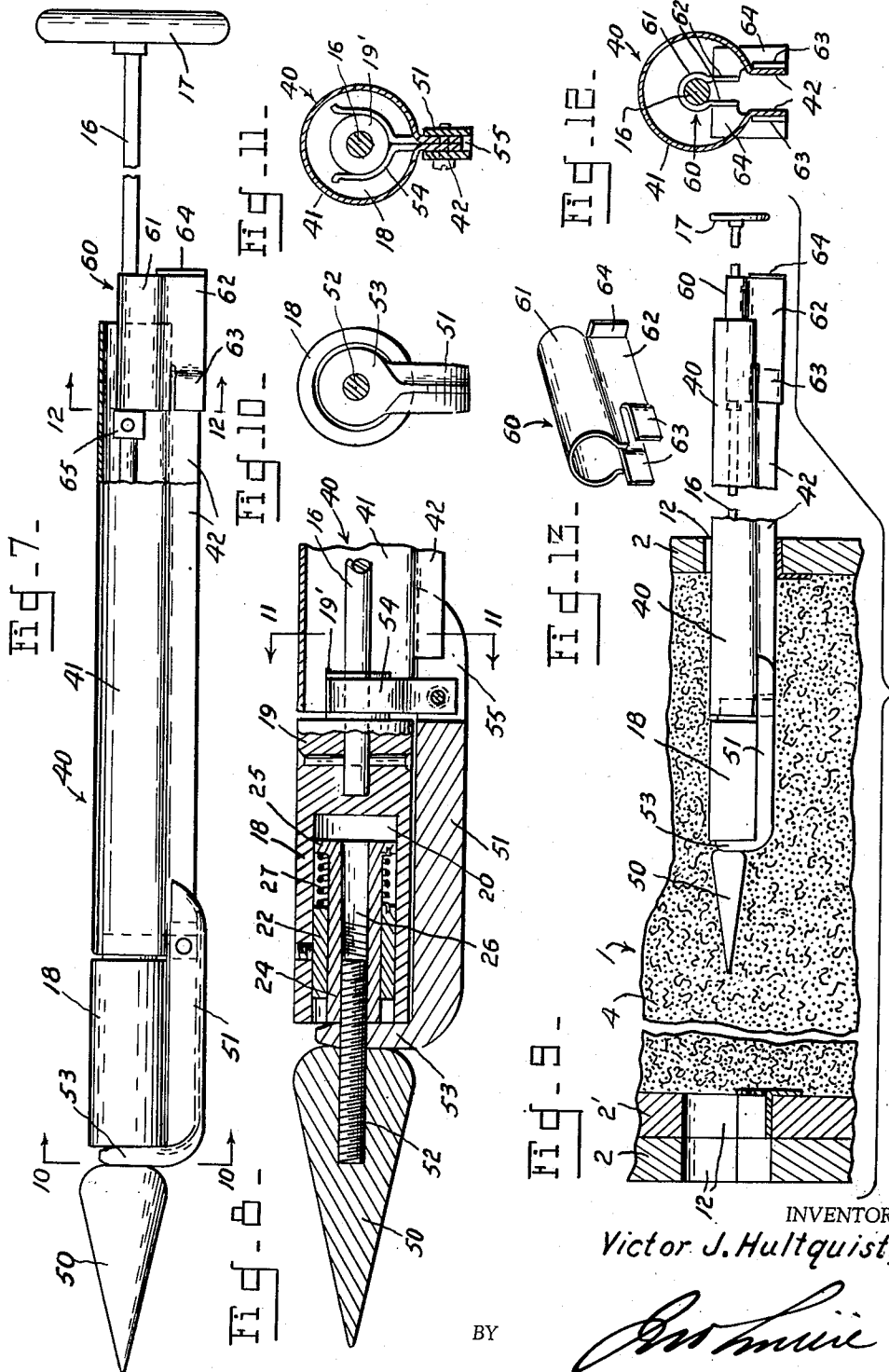
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UNITED STATES PATENT OFFICE

2,661,644

WRENCH COMBINED WITH PUNCH AND
ASSEMBLY TOOL

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12 Claims. (Cl. 81—3)

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This invention relates to tools especially adapted for assembling or disconnecting prefabricated building panels, and more particularly to a combined wrench and channel forming punch.

This application is a continuation-in-part of applications, Serial No. 733,267 filed March 8, 1947, now Patent No. 2,629,138, dated February 24, 1953, and Serial No. 242,345 filed August 17, 1951.

A prefabricated building panel is disclosed in the foregoing applications as comprising a completely closed panel that may be finished on both sides and mounted in edge-to-edge relationship. The edges of the panels are provided with aligned keyhole openings, and these panels are secured by inserting bolts through the panels between the sides thereof and seating the bolts in the keyhole openings. These panels may be filled with insulating material, in which event it is necessary to form channels or passages through the material for the bolts, and if the material is loose, such as rock wool, it is also necessary to insert a shield to restrain the material from closing the passages.

It is an object of the invention to provide a tool for use in assembling the aforementioned panels.

It is another object of the invention to provide a tool for forming channels through insulation within the aforementioned panels.

It is still another object of the invention to provide a tool for forming channels through insulation within the aforementioned panels and simultaneously insert a shield for restraining the insulation.

It is a further object of the invention to provide a tool for forming channels through insulation with the aforementioned panels and also for securing said panels together.

It is a still further object of the invention to provide a combination tool for forming channels through insulation within the aforementioned panels for simultaneously inserting shields to restrain the insulation from the channels and for passing bolts through the channels and securing adjacent panels together.

It is yet another object to provide a socket wrench adapted for inserting bolts through the aforementioned panels and securing the bolts to assemble adjacent panels in rigid relationship, and also to provide such a wrench adapted for punching channels through insulation within the panels and also for simultaneously inserting channel retaining shields within the panels.

It is yet a further object of the invention to provide a tool of the aforementioned type having

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simplicity of organization, economy of construction and efficiency in operation.

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawings, wherein like reference characters indicate like parts throughout the several figures and in which:

Figure 1 is a view in perspective of a building panel unit of the type for which the tool of the present invention is particularly adapted;

Figures 2 and 3 are fragmentary views in cross section taken transversely through a panel unit as shown in Figure 1 and illustrating the use of a tool, in accordance with the invention, in assembling the units, two modifications of the tool being shown in the respective figures;

Figures 4 and 5 are fragmentary cross sectional views taken longitudinally through the wrench head of a tool in accordance with the invention;

Figure 6 is a view in perspective of a channel defining shield for insertion into an insulated panel unit;

Figure 7 is a side view in elevation of a tool in accordance with the invention adapted as a channel forming punch and a shield inserter, a shield as shown in Figure 6 being supported by the tool and being partially broken away at one end to show the shield support;

Figure 8 is an enlarged fragmentary cross sectional view taken longitudinally through the punch end of the tool shown in Figure 7;

Figure 9 is a fragmentary cross sectional view taken transversely through an insulated panel unit and illustrating the use of the tool shown in Figure 7;

Figure 10 is an enlarged cross sectional view corresponding to line 10—10 of Figure 7;

Figure 11 is an enlarged cross sectional view corresponding to line 11—11 of Figure 8;

Figure 12 is an enlarged cross sectional view corresponding to line 12—12 of Figure 7; and

Figure 13 is a view in perspective of the clip on the tool for supporting one end of the channel sleeve.

Referring now to the drawings, the present invention comprises a tool for performing the method, claimed in Patent No. 2,629,138, dated February 24, 1953, of assembling prefabricated building panel units, such as shown in Figure 1,

and specifically claimed in continuation-in-part application, Serial No. 242,345 filed August 17, 1951.

Referring specifically to Figure 1, the tool in accordance with the invention is adapted for use in assembling prefabricated building panel units 1, which are rectangular in shape and comprise a double walled closed unit including spaced edge rails 2 and 2', and opposite side panels 3 and 3', the panels bridging the space between the edge rails and being coextensive therewith. The units may be filled with insulating material 4 and closed at both ends.

In use, whether for wall, roof or floor, the units are designed to be assembled in edge-to-edge relationship, with the edge rail of one unit abutting the edge rail of the next. When the unit is in place in a wall, the edge rails 2 serve as studs to take the vertical weight thrust, and in certain constructions, when used as roof or flooring, the edge rails function as weight supporting rafters and joists. The edge rails are so formed that adjacent units will interlock, imparting strength and rigidity to the assembled units and providing a weather-seal. The interlocking structure preferably takes the form of a wedging stepped joint to facilitate assembly of abutting edge rails.

When assembling a building with the present building units, two units are placed in edge-to-edge position, as indicated in Figures 2 and 3, and the units are joined by means of bolts B extending perpendicularly through the abutting edge rails 2. It should be noted that the bolts B are standard carriage bolts which have a square shank portion immediately adjacent the bolt head. Due to the fact that, in the erection of a building, the units are of closed box structure and are sequentially positioned, the bolts must be passed through the abutting edge rails which are completely enclosed and are remote from the free edge of the last positioned unit.

It will be obvious that under the foregoing circumstances, special means must be provided for positioning the bolts and for drawing them up into place. To this end, the opposite edge rails have formed therein aligned bolt holes 12, so that the bolts B may be inserted through the unit and seated in the aligned holes 12 in the opposite edge rail as well as the abutting edge rail of the adjacent unit. The bolt holes 12, as shown in Figure 1, are in the form of keyhole openings, the enlarged upper portions being of sufficient size to permit the passage of the bolt B, its companion nut, a washer if necessary, and the head of the wrench 15, as shown in Figure 2. The lower portion of the opening is of sufficient width to receive the shank of the bolt and snugly fit two opposite sides of the square portion on the bolt shank, as shown in Figure 3.

The present invention relates to the aforementioned special means, which basically comprises an elongated wrench 15 which is specially designed to support, insert through the unit and then operate a bolt, as shown in Figures 2 and 3. The wrench 15 comprises an elongated shank 16 having a handle 17 at one end and a head 18 at the other end. The shank 16 of the wrench preferably is of a diameter no greater than that of the bolts B, so that the wrench shank can be lowered to fit into the slot of the keyhole in the free edge rail in order to lower the bolt into the slot of the keyhole in the opposite rail. The wrench shank 16 preferably is slightly less in diameter than the width of the keyhole slot so

that it will be free to rotate while in the slot. The shank 16 may be secured directly to the wrench head 18, as shown in Figure 3, or it may be telescopically adjustable in a sleeve 16a and secured by a set screw 16b, as shown in Figure 2.

The wrench head 18, as best shown in Figures 4 and 5, comprises a body 19, having a cylindrical axial bore 20 opening through the forward end thereof, the outer end portion of the body around the bore being formed as a wrench socket 21 for receiving and cooperating with a bolt nut. A sleeve 22, which is shorter than the bore 20, is fixed within the bore 20 with its outer end preferably substantially coinciding with the inner end of the socket 21. The sleeve 22 has a cylindrical bore 23 in which is slidably and rotatably mounted a sleeve 24 that is provided at its inner end with a flange 25 slidable within the bore 20.

The sleeve 24 also has an axial bore 26 and at least the forward end of this bore 26 is internally threaded to receive the threaded end of a bolt B. A coiled spring 27 is fitted within the bore 20, around the sleeve 24 and interposed between the flange 25 and the inner end of the fixed sleeve 22. The ends of the spring 27 are turned outwardly and are respectively seated in small holes 28 and 29 in the inner end of the fixed sleeve 22 and the flange 25, respectively. Thus, the coiled spring 27 biases the threaded sleeve 24 into the body 19 and resists relative rotation therebetween.

When it is desired to couple two of the building units, a pair of washers if necessary, may be placed upon a bolt B, and a nut threaded on the end of the bolt. The threaded end of the bolt is then threaded into the bore 26 of the sleeve 24 far enough to support the bolt in alignment with the body of the wrench. The bolt is then pulled to slide the sleeve 24 out, as shown in Figure 4, whereupon the nut is threaded back substantially against the end of the sleeve and aligned with the socket 21, the sleeve 24 then being retracted by the spring 27 to seat the nut in the socket 21, as shown in Figure 5.

Two of the units 1 are then assembled by positioning them in edge-to-edge relation with the stepped open faces of the edge rails 2 substantially interfitting and with at least one keyhole 12 of each of the abutting edge rails 2 in alignment. The wrench 15, carrying a bolt B, is then passed through the upper part of the keyhole 12 in the free edge rail which corresponds to the aligned keyholes in the abutting edge rails, as shown in Figures 2 and 3. The wrench, with the bolt, is passed through the unit and the bolt is inserted through the upper parts of the aligned keyholes in the opposite edge rail and the edge rail of the abutting unit, as shown in Figure 2. By means of the wrench, the bolt is so positioned that the bolt head is on the inside of one abutting edge rail and the nut on the inside of the other abutting edge rail.

The wrench is then lowered, as shown in Figure 3, so that the shank of the wrench is inserted into the lower slot of the keyhole in the free edge rail and the bolt is inserted into the lower slots of the two keyholes in the abutting edge rails, which slots are of sufficient width to receive the bolt shank but of less width than the bolt head and the nut, and washers if they are used. The lower portion, at least, of the slots is of a width to snugly fit two opposite sides of the square portion on the shank of the bolt B adjacent the bolt head to prevent the bolt from turning. The

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wrench is then turned to thread and tighten the nut on the bolt to clamp the abutting edge rails together.

When the nut is tight on the bolt B, the wrench 15 is then removed from the bolt and withdrawn through the keyhole in the free edge rail of the unit. To remove the wrench from the bolt, the handle 17 is pulled in opposition to the spring 27 to withdraw the socket 21 from the nut. The wrench is then rotated to unthread the sleeve 24 from the bolt. The sleeve 24 is restrained against rotation in the bore 23 and caused to rotate with the wrench by the spring 27 due to the anchoring of its ends in the holes 26 and 29. The step is illustrated in Figure 4.

The insulation of the units 1 may be effected in any desired manner, and as shown in Figures 1-3, may comprise loose fibrous insulation. If such insulation is employed, it obviously would interfere with the passage of the bolts through the unit during assembly of a building structure. In order to maintain a clear path between the corresponding keyholes 12 in the opposite edge rails 2 of a unit, a tubular member 40 may be interposed between said rails and aligned with the keyholes, as shown in Figures 2 and 3.

The tubular member 40 may comprise a complete tube of desired cross section and may be installed during the fabrication of the panel units. To facilitate fabrication and reduce costs, and also to permit the installation of the tubular members as needed at the construction job, it is preferred to adapt these members as tubular shields that may be inserted in the prefabricated units by the tool incorporating the present invention. As shown in Figure 6, these shields 40 may be formed of sheet material and bent to a keyhole cross section including a circular portion 41 and substantially parallel flanges 42, depending from the edges of the circular portion. The flanges 42 are notched at the ends to be recessed from the end of the tubular portion. This shield may be formed of any suitable sheet such as metal, hardboard or the like. The material should be tough and springy, and if a hardboard or cardboard material is employed, the ends of the tubular portion 41 may be reinforced with suitable collars 43 to both retain the conformation and provide resilience to the circular portion.

In order to form the channels through the insulation in the panel units in communication between the keyholes 12 in the opposite edge rails, the tool of the present invention is adapted as a punch and shield carrier, as best shown in Figures 7-9. In this case, the aforementioned wrench head 18 is provided at its free end with a pointed punch 50 and along its periphery with a radial shoe 51.

The punch 50 and shoe 51 are removably mounted on the wrench head, as shown in Figure 8, by means of a threaded stud 52 on the rear end of the punch 50, and which is threaded in the bore of the sleeve 24. The shoe 51 has an eyelet portion 53 at its front end which is interposed between the punch 50 and head 18 and mounted on the stud 52. A spring clip 54 is fixed to the rear end portion of the shoe 51, and this clip releasably grips a boss 19' on the rear end of the body 19 of the wrench head 18, or said clip can grip the telescopic sleeve 16a of the tool shown in Figure 2.

The forward and rear ends of the shoe 51 are tapered, as best shown in Figures 7 and 10, in order to facilitate the movement of the shoe through the insulation 4 within the panel unit 1, 75

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as illustrated in Figure 9. Thus, if the insulation is stable, as in a bat, the tool with the punch 50 and shoe 51 may be inserted in a keyhole 12 in one edge of the unit and forced through the insulation to the corresponding keyhole in the opposite edge of the unit and thereby form a channel through the insulation of keyhole section.

If, however, the insulation is a loose fibrous material, the tool is adapted as a shield carrier so as to insert a shield 40 as it is forced through the insulation so that the shield will support and restrain the insulation from falling into the channel formed by the tool. For this purpose, the rear end portion of the shoe 51 that extends beyond the head 18 is provided with a longitudinal slot 55 that is radial of the shank 16. In addition, a U-shaped clip 60, as shown in Figures 7, 9, 12 and 13, is removably and slidably mounted on the shank 16, this clip having a central rounded portion 61 for fitting around the shank 16 and a pair of substantially parallel flanges 62 extending from the portion 61. At the forward end, the flanges 62 are longitudinally slotted to provide tongues 63, and these tongues are offset from the flanges 61. At their rear edges, the flanges 61 are provided with outwardly extending wings 64.

A shield 40 is mounted on the tool by fitting it around the shank 16 so that the tubular portion 41 is substantially coincident with the head 18. The forward ends of the shield flanges 42 are then pressed together and inserted in the slot 55 of the shoe 51, as best shown in Figures 7, 8 and 11. The rear edges of the shield flanges 42 are then guided within the tongues 63, between said tongues and their respective flanges 62, as the clip 60 is slid forwardly along the shank and within the tubular portion 41 of the shield.

When the shield 40 is mounted, the tool is inserted through the unit as previously described, except that the operator presses against the wings 64 of the clip 60 as he pushes the tool through the insulation to prevent the forward ends of the shield flanges 42 from being withdrawn from the shoe slot 55. The tool and shield are pushed through the panel unit until they reach the opposite keyhole 12. As soon as the forward end of the tubular portion 41 of the shield 40 is inserted into the opposite keyhole, pressure on the wings 64 of the pusher clip 60 is released while the advancement of the tool continues.

Friction between the insulation will retard the shield so that advancement of the tool causes the shoe 51 to move from the shield and release the forward ends of the shield flanges 42. As soon as the shoe releases the shield flanges, said flanges spring apart so that they straddle the narrow slot of the keyhole 12. Consequently, upon further pressure on the pusher clip 60, the shield 40 is advanced until the forward edges of the flanges 42 abut the inner surface of the opposite unit edge rail.

When the shield is advanced the limit by the pusher clip 60, the clip will be nested within the keyhole of the near edge rail and the rear edges of the shield flanges 42 will be within the unit while the end of the tubular portion 41 is within the keyhole. The clip 60 is then withdrawn, as by pulling back on the wings 64 of the clip, and this withdraws the clip tongues 63 from the shield flanges 42 which immediately spring apart to abut the inner surface of the adjacent edge rail. The shield is then locked in the panel unit and is supported by the ends of the tubular portions 41 nested in round portions of the keyholes

12 to thereby resist displacement by the weight of the insulation. Obviously, the shield 40 then forms a keyhole-shaped channel through the panel unit to accommodate the passage of the wrench and bolt in assembling the units.

Preferably, as shown in Figure 7, a stop collar 65 is slidable on the shank 16 and selectively positioned, as by a set screw on the shank to form an abutment for the pusher clip 60. This prevents undue pressure on the clip which might tend to buckle a shield during the inserting process. Moreover, if the tubular portion 61 of the clip conforms to the shank 16, as shown in Figure 12, this collar will abut and retract the clip 60 from the keyhole upon withdrawal of the tool.

While it is immaterial how the spring clip 54 is mounted on the shoe 51, in the preferred construction, as shown in Figures 8 and 11, fabrication is facilitated by forming the clip of two preformed leaf springs, or a folded single spring, having the anchor end portions sandwiched together within the inner end of the shoe slot 55 and secured by a rivet or screw. The clip 54 may thus be formed as a yoke that readily snaps onto or off of the boss 19'.

In many instances, it is desirable to run utility lines through a wall or like construction, and the panel units may be readily adapted for this by boring holes 12', Figure 1, in the edge rails 2 and/or 2' and then forming a channel and inserting a shield 40, if necessary, between the holes by the tool of the present invention.

Although certain modifications of the invention have been shown and described, it is obvious that modifications thereof are possible. The invention, therefore, is not to be restricted except insofar as is necessitated by the spirit of the appended claims.

What I claim is:

1. A tool comprising an elongated shank, a head on one end of said shank, a handle on the other end of said shank, a pointed punch on the end of said head, and a shoe extending longitudinally of said head and being tapered at both ends.

2. A tool as defined in claim 1, wherein said shoe extends beyond the rear end of said head and the extended portion is longitudinally slotted radially of said head.

3. A tool as defined in claim 2, comprising substantially parallel flanges spaced from said head and extending from said shank in alignment with said shoe, and longitudinally extending tongues offset outwardly from said flanges.

4. A tool as defined in claim 3, wherein said flanges are carried by a clip that is slidably mounted on said shank, a collar adjustably mounted on said shank to limit movement of said clip toward said head, and outwardly extending wings on said flanges to facilitate movement of said clip along said shank.

5. A tool comprising an elongated shank, a wrench head at one end of said shank and having a threaded bore, a pointed punch having a stem threaded in said bore, and a shoe extending longitudinally of said head and having at one end an eyelet interposed between said punch and said head and mounted on said stem, and a spring clip at the other end of the shoe clamping around said shank.

6. A tool as defined in claim 5, wherein said wrench head comprises a body having a bore with a nut-receiving socket at the outer end, a sleeve slidably positioned in said bore and having said threaded bore therein, and means in said bore to normally urge said sleeve inwardly of said socket.

7. A tool as defined in claim 5, wherein an enlarged portion surrounds said shank at the inner end of said head and said spring clip engages around said enlarged portion.

8. A tool as defined in claim 5, wherein said stem is telescopically adjustable.

9. A tool comprising an elongated shank with a wrench head at one end, said head comprising a body having a bore with a nut-receiving socket at one end, a sleeve slidably positioned in said bore and having a threaded bolt-receiving recess therein, and means in said bore to normally urge said sleeve inwardly of said socket.

10. A tool as claimed in claim 9, said sleeve being rotatably mounted in said barrel and said means resisting rotation therebetween.

11. In a wrench having an elongated shank with a head at one end, said head comprising a body having a central bore closed at one end, the bore being of two diameters forming an annular shoulder therebetween, a sleeve slidably in said smaller bore and having an annular flange to coact with said shoulder to form a stop, a spring in said larger bore between said shoulder and flange and urging said sleeve toward said closed bore, and a nut-receiving element at the open end of said bore, said sleeve having a threaded bolt-receiving recess in axial alignment with said nut-receiving element.

12. In a wrench as claimed in claim 11, said shank comprising a sleeve portion and a rod portion slidably in said sleeve portion, and means for securing said rod portion in selected position relative to said sleeve portion to selectively vary the length of said shank.

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