

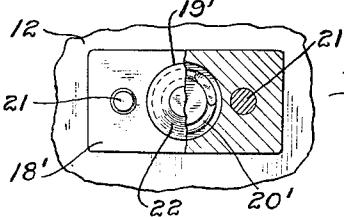
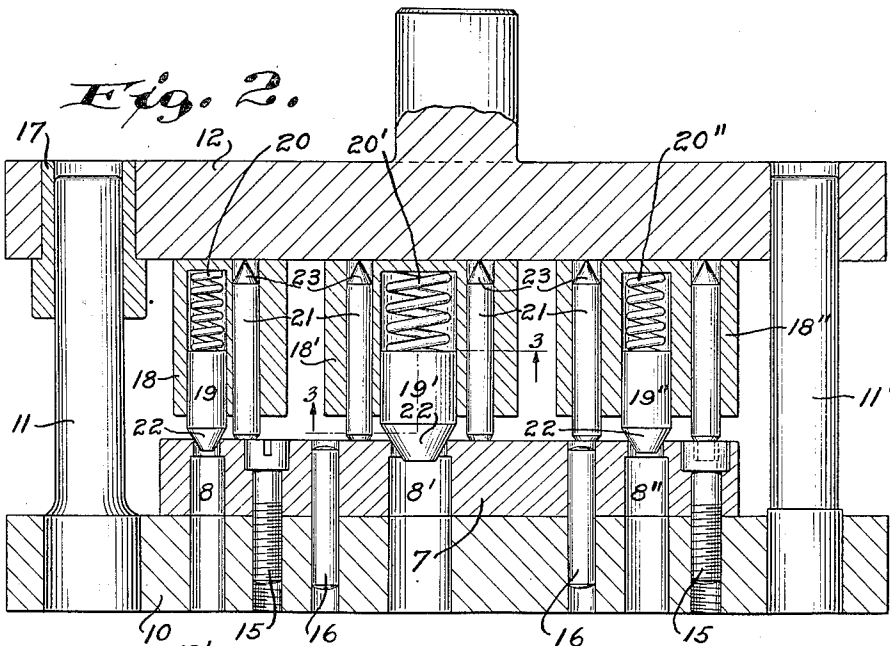
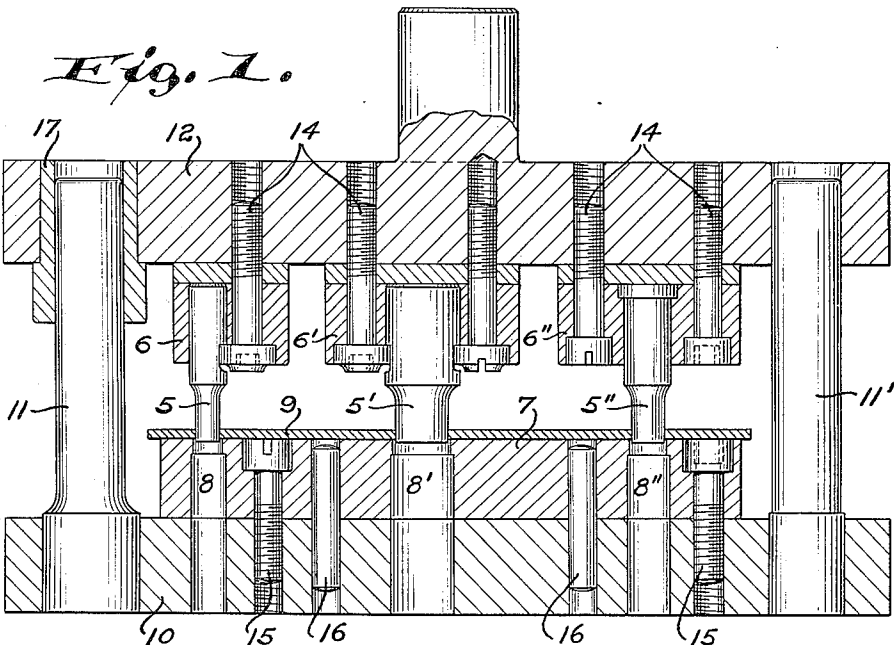
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METHOD OF MOUNTING COOPERATING TOOLS

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METHOD OF MOUNTING COOPERATING TOOLS

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5 Claims. (Cl. 29—84)

My present invention relates generally to improvements in the art of constructing tools or the like, and relates more specifically to an improved method of properly positioning piercing or distorting punches relative to their dies, and vice versa.

Generally stated, an object of the present invention is the provision of an improved mode of quickly and accurately locating punches and dies, so as to insure most efficient coaction between such tool elements.

It is common practice in the art of tool making, to utilize relatively standardized individual punch carriers or retainers for confining and supporting the perforating or distorting tools. These retainers are normally attached to a punch support or holder, and the punches must accurately cooperate with the corresponding depressions or openings in the female member or die upon which the work rests during the distorting or perforating operation. The die which is usually made special for each particular job, is mounted upon a supporting shoe having one or more fixed guide pins with which the punch support has sliding coaction, and it has heretofore involved tedious work and considerable loss of time in order to secure fairly accurate location of the individual punches upon their support in such manner that one or more of these punches would properly cooperate with one or more depressions formed in a single die. In accordance with the prior practice, the die-maker would permanently attach the completed die to its supporting shoe, and would subsequently temporarily attach the individual punch retainers to the punch holder so that the punches would approximately enter their receiving depressions or openings in the die. Then, by cut and try methods, the mechanic would adjust and finally position and attach each individual punch retainer to the holder in the desired position; and it was most difficult if not impossible, with this prior method, to insure the production of accurate final results.

The present invention therefore contemplates the provision of a new method of positioning the punch retainers upon a support, so that most accurate cooperation of the punches and dies will result, thereby insuring production of extremely accurate distorted or perforated objects, and also prolonging the life of the tools.

Another specific object of the invention is to provide simple and highly effective instrumentalities for effecting rapid positioning of one tool so as to insure proper coaction thereof with a complementary tool or element.

Still another specific object of my present invention is the provision of a new and useful method of accurately positioning a punch retainer or the like upon its carrier and relative to a die, and for facilitating subsequent rigid attachment of the retainer to its carrying member.

A further specific object of the invention is to provide a system for accurately and conveniently aligning one or more cooperating punches and dies, without necessitating the use of cut and try methods.

These and other specific objects and advantages will be clearly apparent from the following detailed description.

A clear conception of the several steps of the improved method, and of the construction and use of one type of implement for carrying on commercial exploitation of the method of applying punch retainers to their supports, may be had by referring to the drawing accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the several views.

Fig. 1 is a central vertical section through a typical punch and die assemblage, showing several individual punch retainers and punches cooperating with a single die and in the act of perforating a piece of sheet material;

Fig. 2 is a similar section through the same die, die supporting shoe, and punch support, the punches and retainers however having been replaced by several of the improved devices for facilitating proper location and attachment thereof to the retainer support; and

Fig. 3 is a part sectional bottom view of one of the improved punch attachment facilitating devices, the section being taken along the line 3—3 of Fig. 2.

Although the improvement has been shown and described herein, as being especially useful for the purpose of insuring proper cooperation between a perforating punch and die, it is not the intent to unnecessarily restrict the scope by such specific embodiment or adaptation, and the improved method may obviously be employed to facilitate location of the dies instead of the punches, or possibly also for other purposes.

Referring to the drawing, the perforating assemblage illustrated in Fig. 1, is of relatively well known construction, comprising in general, a plurality of individual punches 5, 5', 5'', each of which is carried by and confined within an independent carrier or retainer 6, 6', 6''; a single block or die 7 having depressions or perforating openings 8, 8', 8'' cooperable with the punches 5,

5'. 5'' respectively to pierce a piece of stock 9; a lower support or shoe 10 upon which the die 7 is firmly mounted; parallel guide pins 11, 11' fixedly secured to and extending upwardly from the shoe 10; and a punch support or holder 12 slidable along the pins 11, 11' and having the punch retainers 6, 6', 6'' rigidly attached thereto. The shoe 10 and holder 12 are normally relatively reciprocable to perforate the successive pieces of stock 9 interposed between the punches 5, 5', 5'' and the die 7, in any well known manner, and the material from which the stock 9 is formed, may be metal, wood, paper, bakelite, rubber or any other fibrous or relatively hard substance.

The punches 5, 5', 5'' may be detachably secured to their respective retainers 6, 6', 6'' in any suitable manner, and these retainers are preferably rigidly attached to the holder 12 by means of positioning and clamping screws 14 which may have special heads, but all of which have threaded shanks coacting with threaded holes in the holder 12. The individual punch retainers 6, 6', 6'' are of relatively standardized construction, and in some cases, the clamping screws 14 may be utilized to simultaneously clamp the punches and their retainers to the holder 12 in the manner illustrated in my prior Patent No. 2,017,247, granted October 15, 1935. The die 7 is usually specially constructed to suit each particular perforating job, and this die is rigidly attached to the supporting shoe 10 by means of clamping screws 15 and positioning dowel pins 16. The guide pins 11, 11' may be attached to the shoe 10 in any convenient manner, and one or more of these pins may coact with a wearing bushing 17 as shown.

The improved instrumentalities for facilitating location and attachment of the punches 5, 5', 5'' and their retainers 6, 6', 6'' to the holder 12 in proper position relative to the die openings 8, 8', 8'', are shown in Figs. 2 and 3, and it will be noted that the punch holder 12 of Fig. 2 has not yet been drilled and tapped for the reception of the clamping screws 14. Each of the improved punch positioning devices comprises in general, a block 18, 18', 18'' adapted to coact with the flat lower surface of the punch holder 12 and having a bore within which a centering plunger 19, 19', 19'' of corresponding diameter is slidable; a helical compression spring 20, 20', 20'' disposed within the plunger receiving bore of each block 18, 18', 18'' and coacting with the adjacent plunger 19, 19', 19''; and one or more center punches 21 carried by and slidably cooperable with another bore or bores extending through the blocks 18, 18', 18''. Each of the plungers 19, 19', 19'' has a tapered lower end 22 adapted to fit within die openings 8, 8', 8'' of various diameters, and the center punches 21 have pointed upper ends 23 and are of sufficient length to extend entirely through the corresponding blocks 18, 18', 18'' with which they are associated.

When it becomes desirable to assemble a punch and die structure such as shown in Fig. 1, with the aid of the present invention, the die 7 is initially completed and attached to the shoe 10 with the use of the screws 15 and dowel pins 16, and the blank punch holder 12 is prepared and applied to the guide pins 11, 11', as shown in Fig. 2. One or more of the improved punch positioning devices, may thereafter be positioned as indicated in Fig. 2, with the tapered lower end 22 of the plunger 19, 19', 19'' coacting with the adjacent die opening 8, 8', 8'', and with the upper flat surface of its block 18, 18', 18'' coacting with

the lower surface of the punch holder 12. The holder 12 may then be moved cautiously toward the die 7, whereupon the spring or springs 20, 20', 20'' will be compressed by virtue of the movement of the corresponding plunger or plungers 19, 19', 19'' thereagainst and relative to the corresponding block or blocks 18, 18', 18''. This compression of the springs by the plungers will continue until the center punches 21 are elevated sufficiently to bring their upper pointed ends 23 into engagement with the punch holder 12, and thereafter until center punch recesses for the clamping screws 14 have been produced at the proper positions in the holder 12. When these center punch recesses have thus been formed, the holder 12 and shoe 10 may again be separated and the blocks 18, 18', 18'' removed, whereupon the reception holes for the clamping screws 14 may be drilled and tapped. Upon subsequent attachment of the punches 5, 5', 5'' and their retainers 6, 6', 6'' with the aid of screws 14 as shown in Fig. 1, the punches will accurately register with the corresponding die openings, and will thus insure accurate and clean-cut perforations in the stock 9.

From the foregoing detailed description, it will be apparent that the present invention provides an extremely simple method for accurately positioning the punches and for facilitating attachment of the punch retainers, to the punch holder 12, without utilizing any cut and try methods whatsoever. The plungers 19 will accurately position the blocks 18 relative to the holder 12, and it is only necessary that the central axes of these plungers be spaced from the center punches 21, distances equal to the corresponding distances between the punches 5 and the clamping screws 14. The center punches 21 will then accurately locate the centers of the clamping screws 14, when the improved devices are positioned and actuated as indicated in Fig. 2, and the improved instrumentalities can obviously be quickly and conveniently utilized to perform their intended functions. The invention will obviously permit most effective utilization of relatively standard individual punches and punch retainers in conjunction with complex perforating dies having any number of perforating openings therein, and the dies may obviously be split up into any desirable number of parts without regard as to the number of punches associated with each retainer. The present invention has actually proven highly successful in commercial use and has proven its ability to save considerable time and to insure most efficient final results.

It should be understood that it is not desired to limit the present invention to the exact details of construction and to the precise steps of the method herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art. It is especially noteworthy that the improved positioning devices may be utilized for the purpose of accurately locating other types of tools, and need not necessarily be utilized in conjunction with a punch.

I claim:—

1. The method of attaching cooperating tool members to their relatively movable supports, which comprises, attaching the female member to its support, loosely positioning the male member carrier upon its support, interposing a retractible centering element between the opening of the female member and punch receiving socket of the male member carrier and simultaneously

interposing a center punch for the fastener of the male member carrier between said supports, moving the supports toward each other to cause said centering element to accurately position the

5 male member carrier and to subsequently retract so as to permit the center punch to accurately locate the center of the normal fastener for said carrier, and finally applying the male member fastener at the located center punch marking.
 10 2. The method of attaching cooperable tool members to their relatively movable supports, which comprises, rigidly attaching the female member to its support, loosely positioning the male member carrier upon the other support, interposing a retractable centering element between the opening of the female member and the retaining socket for the male member in said carrier, interposing a center punch between said supports within the attaching opening in said carrier, and moving said supports to cause said retractable centering element to initially accurately position said retaining socket in alignment with said female member opening and to subsequently retract so as to permit said punch to accurately locate the center of the final fastener for said carrier.

3. The method of attaching a punch to its support in alignment with a die carried by another support, which comprises, finally attaching the die to its support, loosely positioning the punch carrier upon the other support, placing a resiliently retractable centering element in the punch receiving socket of said carrier and causing the centering portion of said element to coact with the die opening to approximately position the punch carrier, interposing a center punch between said supports and within the normal attaching opening for said carrier, and moving said supports toward each other to cause said element to center said carrier with the die

opening and to subsequently retract so as to permit said center punch to accurately locate the center of the final fastener for the die and its carrier.

4. The method of accurately positioning a punch and die upon relatively movable supports, which comprises, finally attaching the die to its support, loosely positioning the punch carrier alone upon its support, placing a spring pressed plunger having a tapered centering end co- operable with the die opening within the punch receiving socket of the carrier, placing a snug fitting center punch within the fastener receiving opening in the carrier between the die and the punch support, and relatively moving the supports to initially cause said plunger to accurately locate the punch center relatively to the die and to subsequently retract within the punch receiving socket so as to permit the center punch to accurately mark the location of the punch carrier fastening.

5. The method of accurately positioning a punch and die upon relatively movable supports, which comprises, permanently attaching the die to its support, loosely positioning the punch carrier alone upon its support, placing within the punch receiving socket of the carrier a snug fitting spring pressed plunger having a tapered centering end cooperable with the die opening, placing a snug fitting center punch within the fastening receiving opening in the carrier between the die and the punch support, and relatively moving the supports to initially cause the tapered end of the plunger to center the punch carrier relatively to the die and to subsequently retract the plunger within the punch receiving socket sufficiently to permit the center punch to mark the exact location of the punch carrier fastenings.

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