

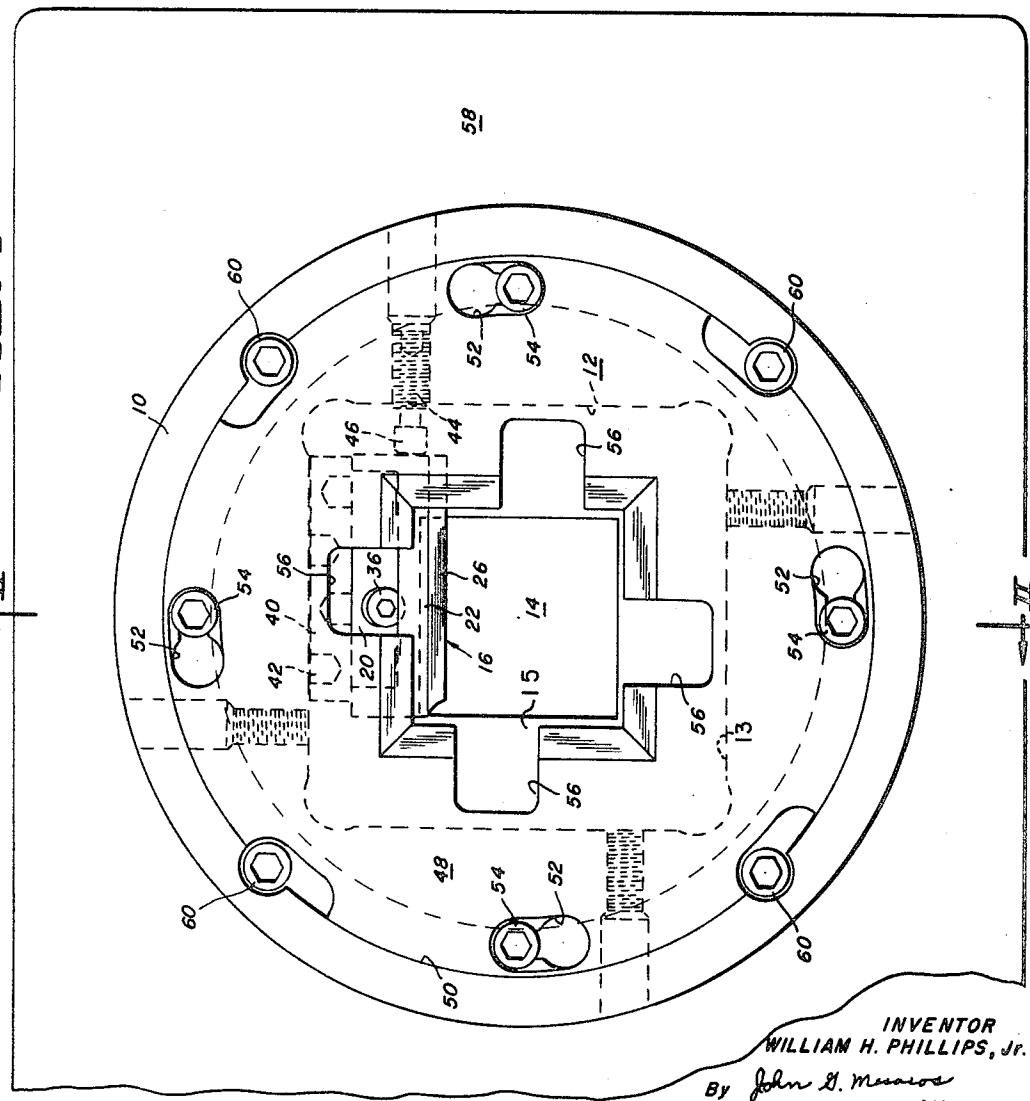
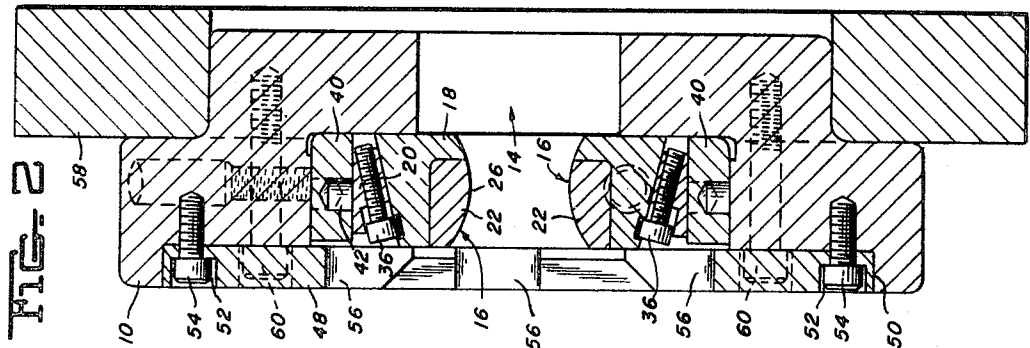
April 8, 1969

W. H. PHILLIPS, JR
ADJUSTABLE DRAWING DIE

3,436,951

Filed May 3, 1966

Sheet 1 of 3



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FIG. 3

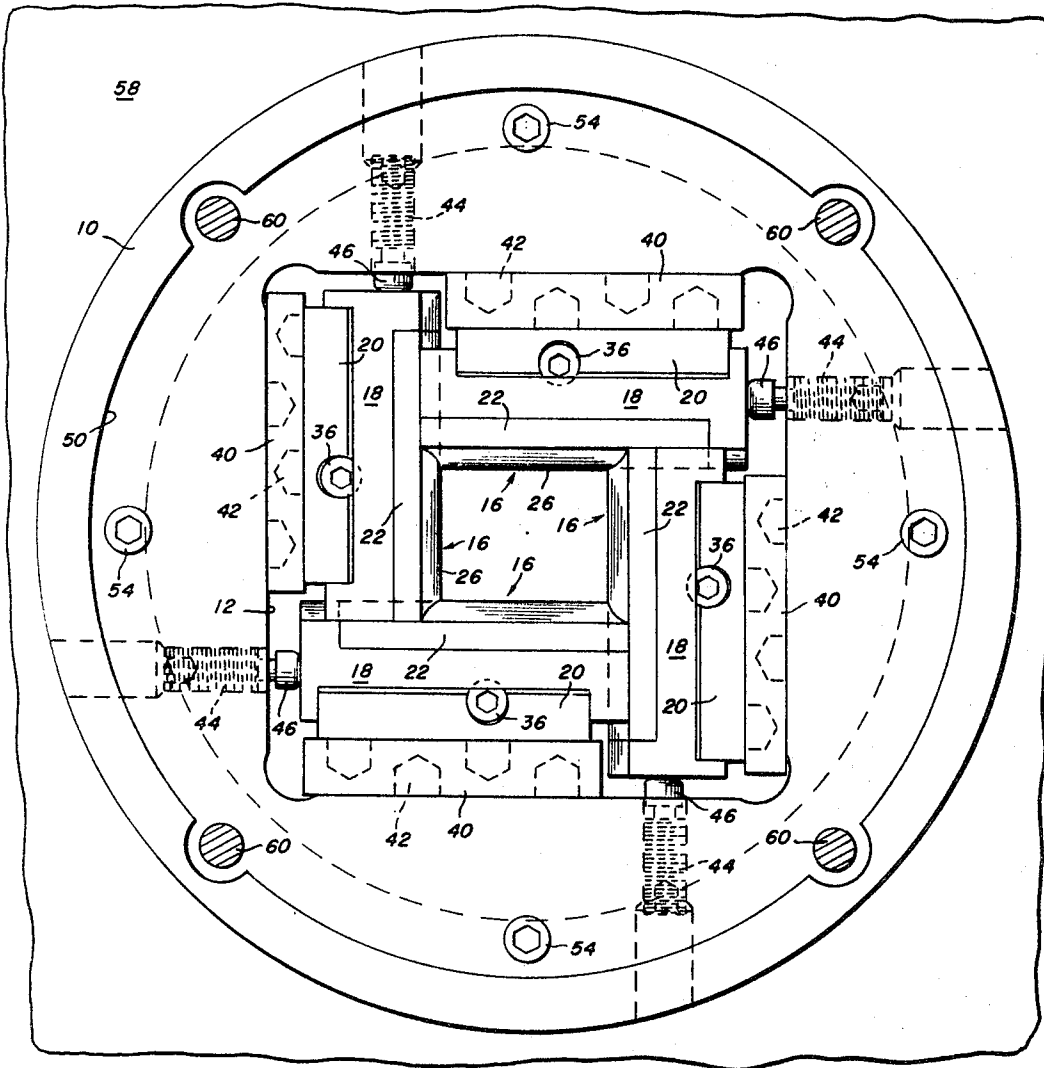
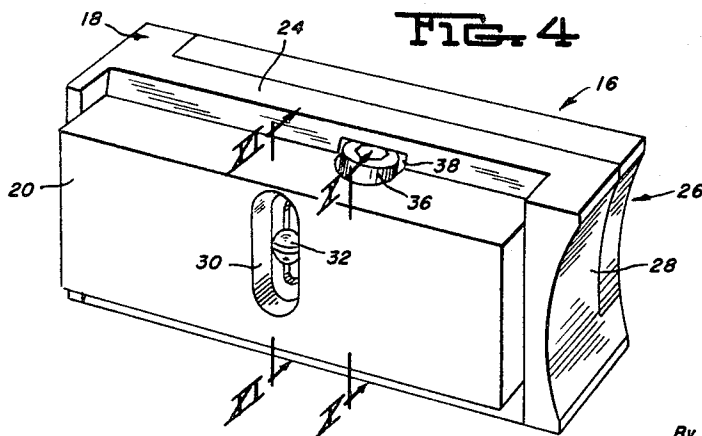


FIG. 4



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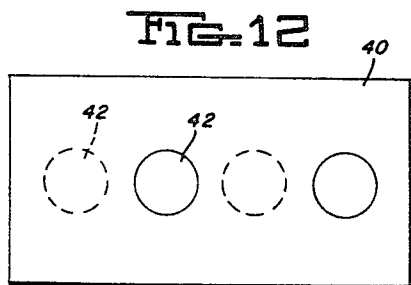
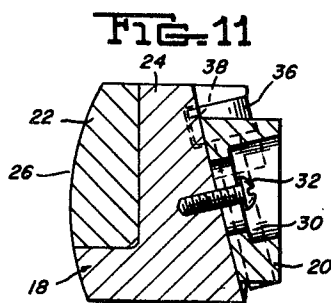
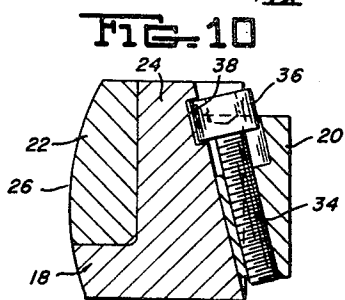
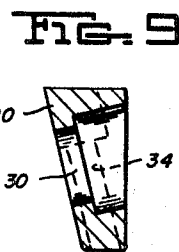
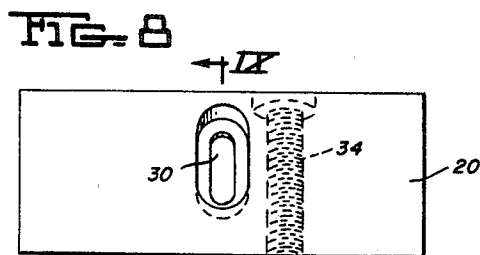
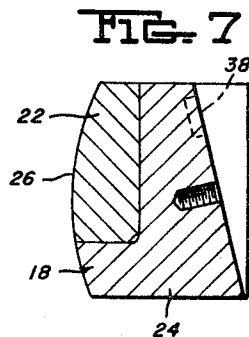
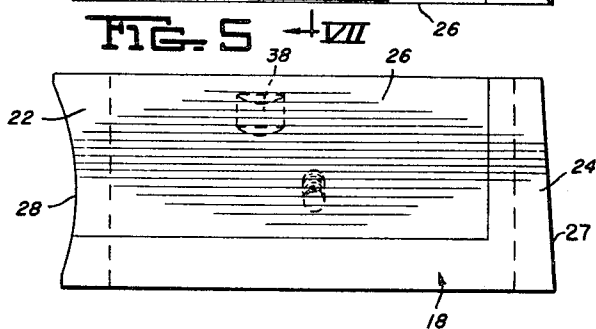
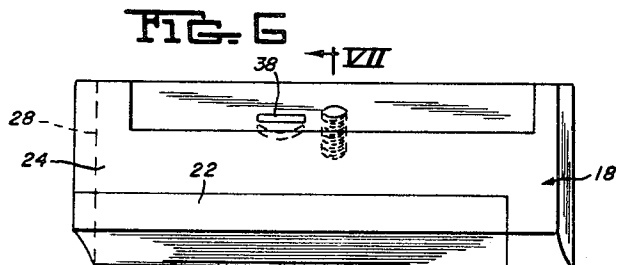
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Sheet 3 of 3



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ADJUSTABLE DRAWING DIE

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9 Claims

ABSTRACT OF THE DISCLOSURE

An adjustable drawing die having die block assemblies, including wedge adjusting means, which form a draw opening that can be adjusted without disassembly of the apparatus.

This invention relates to draw die assemblies, and in particular to draw die assemblies which can be adjusted to exact dimensions while in the assembled condition.

One of the major difficulties in using draw die assemblies made up of a plurality of draw dies is that of obtaining accurate die opening sizes. It has been conventional practice to provide shims between the die blocks and the supporting structure and measure the openings. The assembly is then secured and a test draw made with the resulting piece being measured for dimensional accuracy. Almost invariably the accuracy is not within limits and the assembly must be taken apart and additional shims added or shims removed to correct this. The die is then reassembled and an additional test draw is made. It is not uncommon that several assemblies and disassemblies be required before the die opening produces an acceptable product.

It is therefore a principal object of this invention to provide a draw die assembly having means for adjustment while in the assembled condition.

A related principal object of this invention is the provision of a draw die assembly having readily accessible points for adjustment in the face thereof while the die is in the assembled condition.

A more particular object of this invention is the provision of a draw die assembly which utilizes selectively positionable wedges for adjustment of the die blocks.

These and other objects, together with a fuller understanding of the invention, will become apparent from the following description when taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a front elevational view of a draw die assembly according to this invention;

FIG. 2 is a sectional view taken substantially along the plane designated by the line II—II of FIG. 1;

FIG. 3 is a front elevational view, the draw die of this assembly with the face plate removed showing a different arrangement of filler blocks from that shown in FIG. 1;

FIG. 4 is a perspective view of a die block assembly utilized in this invention;

FIG. 5 is a front elevational view of a die block utilized in this invention;

FIG. 6 is a plan view of the die block of FIG. 5;

FIG. 7 is a sectional view taken substantially along the plane designated by line VII—VII of FIG. 6;

FIG. 8 is a rear elevational view of a wedge utilized in the die block assembly of this invention;

FIG. 9 is a sectional view taken substantially along the plane designated by line IX—IX of FIG. 8;

FIG. 10 is a sectional view taken substantially along the plane designated by the line X—X of FIG. 4;

FIG. 11 is a sectional view taken substantially along the plane designated by line XI—XI of FIG. 4, and

FIG. 12 is a rear elevational view of a filler block utilized in this invention.

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Referring now to the drawings, the draw die assembly includes a support casing 10 having a square die block receiving recess 12 milled therein. The recess 12 has four walls 13 and a base portion 15. A draw opening 14 extends from the recess 12 through the support casing 10 and provides an opening through which the material to be drawn can pass. The die block receiving recess 12 is adapted to receive and support four die block assemblies 16. The die block assemblies are shown in detail in FIG. 4. Each die block assembly 16 includes a die block 18 and a wedge 20. Each die block 18 includes a carbide insert segment 22 fixedly secured to a steel supporting segment 24, as by brazing, for example. The insert segment 22 has ground thereon an arcuate work piece engaging face 26 and one end of each of the supporting segments 24 has an arcuate surface 28 machined thereon of the same arcuate configuration as the face 26 so that the arcuate ends 28 will mate with the faces 26 when the die blocks are in assembled relationship, as will be described presently.

Each of the wedges 20 is provided with an elongated slot 30 through which a screw 32 extends, which screw is threadably engaged in the supporting segment 24. The screw 32 is not tightened securely against the wedge 20, but rather is loose in the slot 30, permitting movement of the wedge 20 with respect to the die block 18, which provides the adjusting action as will be described presently. Each of the wedges 20 includes a centrally located threaded bore 34 which has disposed thereon a cap screw 36. The head of the cap screw 36 extends partially into an arcuate slot 38 milled in the support segment 24. This provides a captivated head, and when the cap screw 36 is rotated, the wedge 20 will move with respect to the die block 18.

The die block assemblies 16 are assembled in the die block receiving recess 12 of the support casing 10 (as shown in FIG. 3), against the base portion 15 thereof, and one or more filler blocks 40 may be interposed between the die blocks 18 and the wall 13 of the recess, depending upon the size opening desired. The filler blocks 40, as can be seen in FIGS. 3 and 12, are in the shape of rectangles and are preferably provided with a plurality of magnets 42 which will aid in retaining the filler blocks in position during assembly of the die assembly, but will allow them to be easily and quickly removed when desired. The selection and use of the filler blocks 40 will be discussed presently.

In order to restrain the die block assemblies 16 against movement, four locking screws 44 are provided in the support casing 10. The locking screws 44 extend through the walls 13 of recess 12 in the casing 10 and have swivel ends 46, each disposed to engage one end 27 of a die block 18, the engaged end 27 being tapered (as shown in FIG. 5). Thus as the locking screw 44 is tightened, the die block 18 is urged toward the support casing 10 to provide better seating of the die block 18.

A face plate or cover 48 (FIGS. 1 and 2) is provided which fits over the die block assembly and seats in a circular groove 50 milled in the casing 10. The cover 48 is provided with key-shaped slots 52, which permit the cover to be slipped over cap screws 54 seated in the casing 10. The cover 48 is rotated slightly and then the cap screws 54 can be tightened to hold the cover 48 firmly in place. Four enlarged cutouts 56 are provided on the cover 48. These cutouts 56 are disposed to be aligned with the cap screws 36 of the die block assemblies when the die block assemblies are in position and the cover is placed on the die assembly. An adaptor plate 58 may be provided to secure the casing 10. The casing 10 is secured to the adaptor plate 58 by a plurality of bolts 60 passing through the casing and threadably engaged with the adaptor plate 58.

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In assembling the die assembly for drawing operations, the locking screws 44 are loosened and four die block assemblies 16 are placed in the recess 12 against the base portion 15 thereof. Filler blocks 40 of the proper size are selected and placed between the walls 13 of the recess 12 and the wedge 20 of each die block assembly 16. The filler blocks 40 are so selected that the approximate size of the desired opening results. The cover 48 is then placed in position. In this condition the cap screws 36 are accessible through the cutouts 56, and an Allen wrench can be used to turn the cap screws 36 to move each die block assembly 16. This movement results from the movement of the wedge 20 toward and away from the front face of the die. Movement of the screw 36 in a direction to cause the wedge to move toward the front of the die (to the left as seen in FIG. 2) will cause the die block 18 to move in a direction of increasing the opening, and movement in the opposite direction will cause the die block 18 to move in a direction decreasing the opening. The final adjustment to the desired size of opening is made using the four cap screws 36, and when this adjustment has been made, the locking screws 44 are tightened to restrain any further movement of the die blocks. The die is then ready for operation. A short test draw will provide measurements, and if the measurements are off, the die opening can be adjusted merely by loosening the locking screws 44 and making the proper adjustments to any required die block assembly 16 by turning the cap screws 36. This adjustment can be made without disassembly, and can be made quickly and easily while the die is actually mounted in drawing position right on the machine. However, if disassembly is required for any reason such as chipped inserts, the assembly can quickly be disassembled and reassembled and readjusted.

Although one embodiment of this invention has been shown and described, various adaptations and modifications may be made without departing from the scope of the appended claims.

I claim:

1. An adjustable draw die assembly comprising a support plate having a recess therein, said recess having a base portion and walls defining a polygonal configuration, a plurality of filler blocks disposed to be arranged in said recess abutting against said base portion, one of each of said filler blocks being disposed adjacent one wall of said recess, a plurality of die blocks disposed to be arranged in said recess abutting against said base portion, one of each of said die blocks being disposed adjacent one side of a filler block, said die blocks having workpiece engaging surfaces defining a die opening, an aperture in said base portion at least the size of said die opening, said die blocks including means to engage adjacent blocks to permit relative movement therebetween,

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tween, wedge means interposed between said filler blocks and said die blocks and disposed to move said die blocks responsive to movement thereof and means to controllably position said wedge means toward and away from the die opening.

2. The combination of claim 1 wherein said wedge means are slidably secured to said die blocks and screw means are provided to move said wedge means selectively with respect to said die blocks.

3. The combination of claim 2 wherein said screw means threadably engages said wedge means and means are provided in said die blocks to restrain axial movement of said screw means.

4. The combination of claim 3 wherein screw means and sockets are accessible from the side of said die blocks opposite said base portion of said support plate.

5. The combination of claim 1 wherein said workpiece engaging surfaces are generally arcuate in cross section and wherein said means on said die block to wedge the adjacent blocks includes an arcuate end portion of a mating configuration to that of the workpiece engaging surface of the die blocks and disposed to slide thereagainst.

6. The combination of claim 1 wherein magnet means are provided on at least one of said support plate and said filler blocks to maintain the filler blocks in engagement with the support plate during assembly of the draw die assembly.

7. The combination of claim 1 wherein a plurality of screw means are provided in said support plate and extending through said walls for engaging said die blocks to maintain said die blocks in the adjusted position.

8. The combination of claim 7 wherein said screw means are disposed to engage at least one end of each of said die blocks.

9. The combination of claim 8 wherein the engaged end of said die block is tapered, the direction of taper being such that the tightening of the screw means forces said die block toward the base portion of said recess.

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