July 6, 1948. G. C. HARDIE 2,444,602

BOLT RE-THREADING APPARATUS

Filed Oct. 3, 1945 2 Sheets-Sheet 1

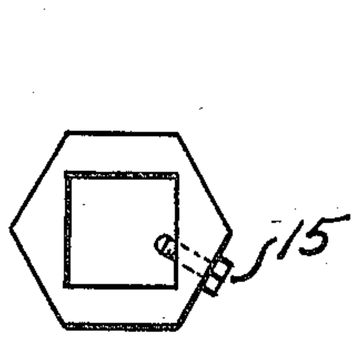

Fig. 4

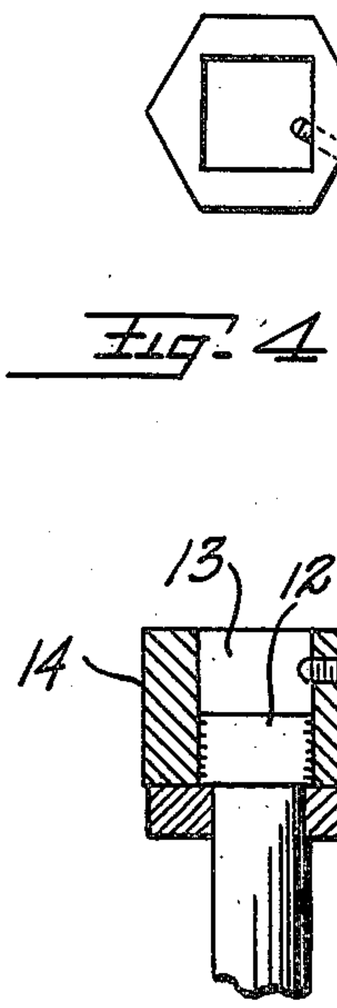

Fig. 3

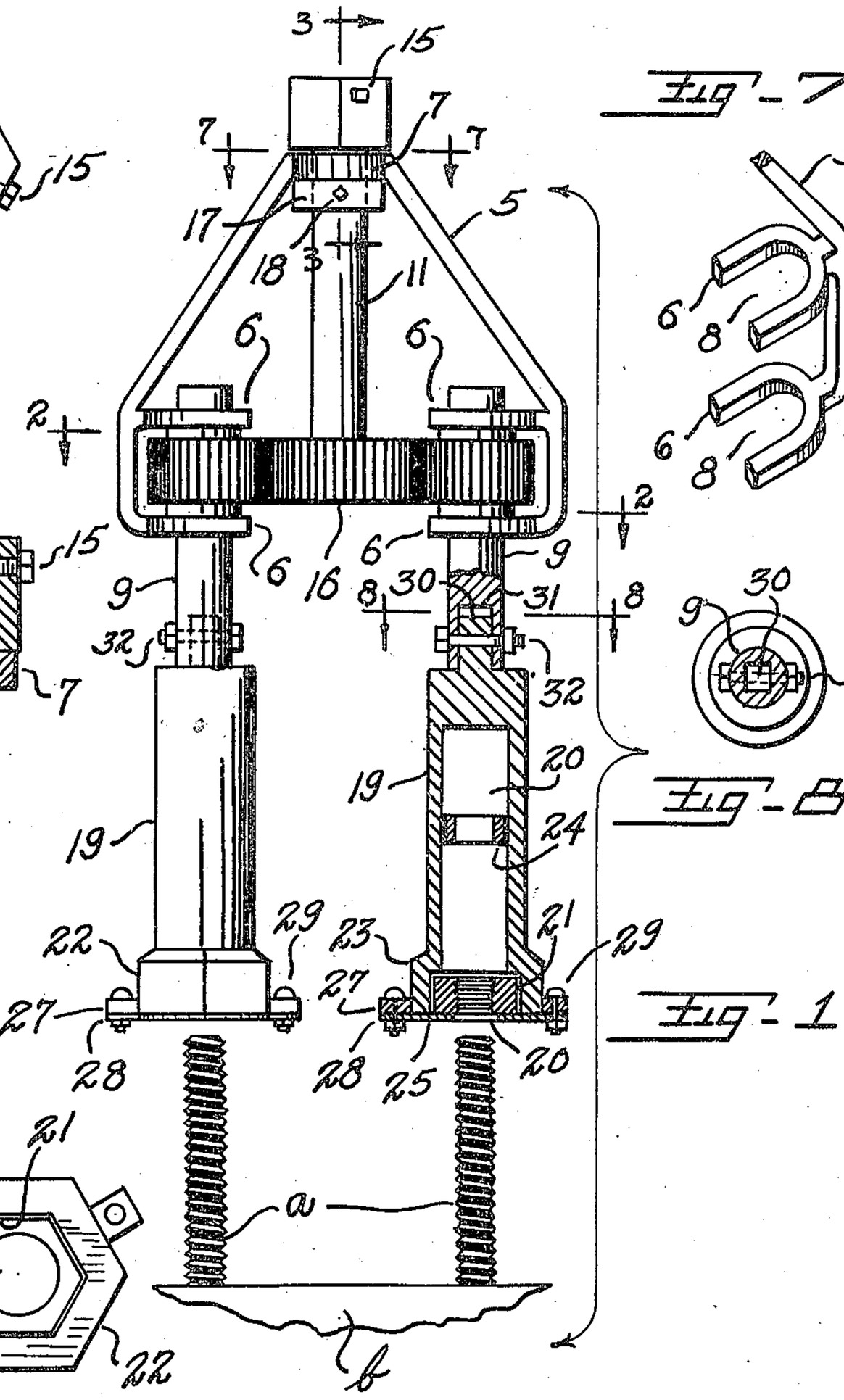

Fig. 1

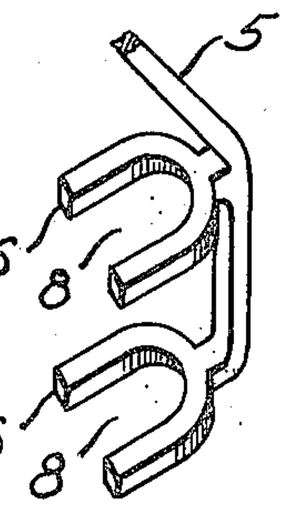

Fig. 7

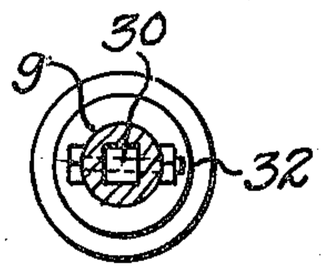

Fig. 8

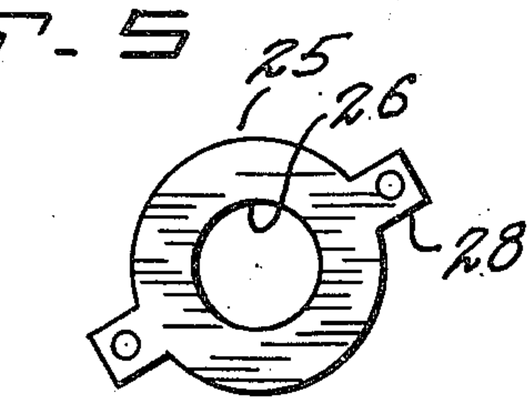

Fig. 5

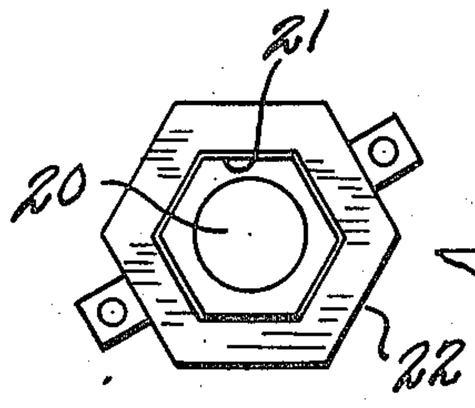

Fig. 6

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July 6, 1948. G. C. HARDIE 2,444,602

BOLT RE-THREADING APPARATUS

Filed Oct. 3, 1945 2 Sheets-Sheet 2

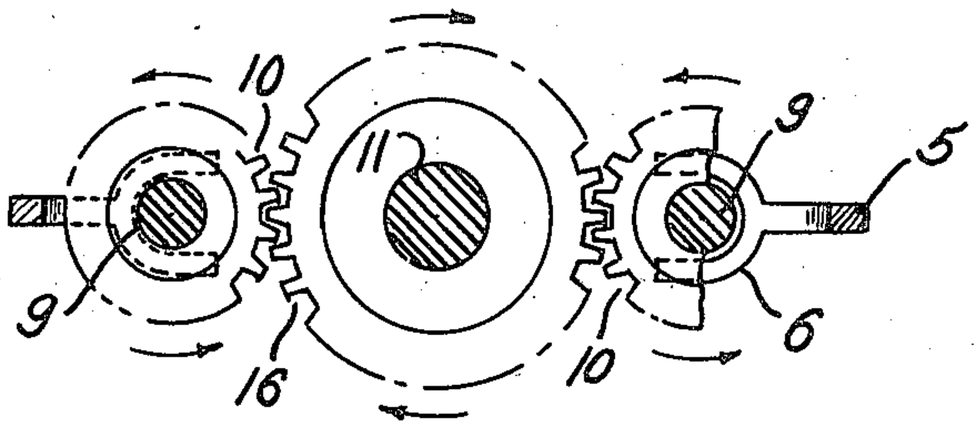

Fig. 2

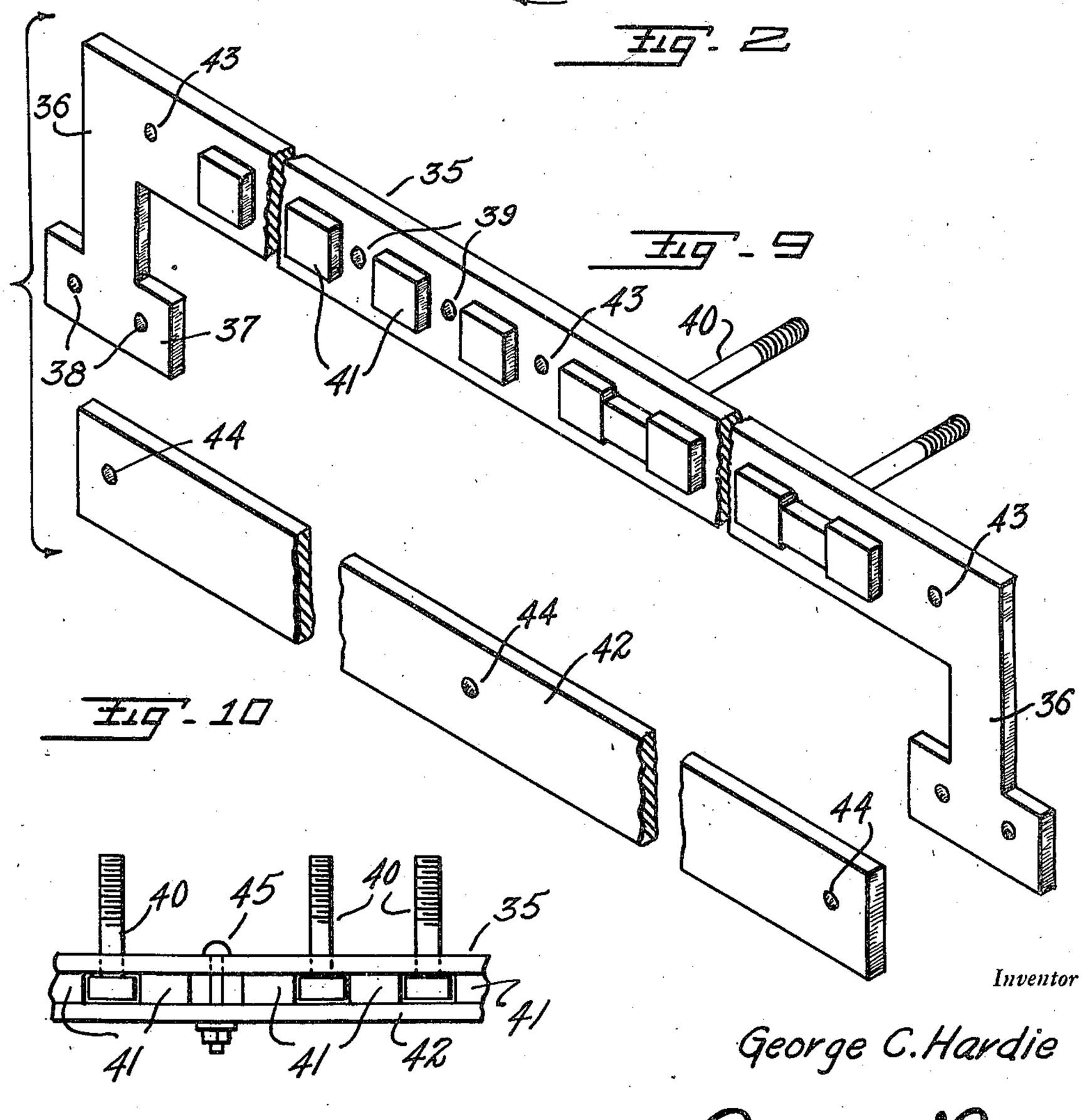

Fig. 9

Fig. 10

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BOLT RETHREADING APPARATUS

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Application October 3, 1945, Serial No. 619,971

3 Claims. (Cl. 10—91)

1

This invention relates to an apparatus for re-threading a plurality of bolts when the threads of the latter have become worn or mutilated.

The primary object of the present invention is to provide an apparatus of the above kind which is comparatively simple in construction and efficient in operation, and which includes a bolt re-threading machine embodying a plurality of holders for threading dies and a drive shaft for said die holders adapted for driving connection with the power driven tool shaft of a drill press or like machine.

A more specific object of the invention is to provide for convenient assembly of the parts of the re-threading machine and removal of the die holders so that a plurality of die holders of different sizes may be readily interchangeably employed.

Still another object of the invention is to provide a re-threading machine adapted for simultaneously re-threading a plurality of adjacent stud bolts fixed in a machine frame or other structure.

Yet another object of the invention is to provide an apparatus of the above kind including simple and efficient means for effectively holding a plurality of headed bolts in position to be threaded by the re-threading machine forming part of the apparatus.

Specific features and additional objects of the present invention will become apparent from the following description when considered in connection with the accompanying drawings, in which:

Figure 1 is a view, partly in elevation and partly in section, of a bolt re-threading machine forming part of the present apparatus, and illustrating the manner of using the machine for simultaneously threading a plurality of stud bolts.

Figure 2 is a transverse section taken on line 2—2 of Figure 1.

Figure 3 is an enlarged fragmentary longitudinal section taken on line 3—3 of Figure 1.

Figure 4 is a top plan view of the construction shown in Figure 3.

Figure 5 is an end elevational view of one of the die holders, looking at the inner end thereof.

Figure 6 is a plan view of the die retaining ring forming part of each die holder.

Figure 7 is a fragmentary perspective view showing one side portion of the frame of the re-threading machine.

Figure 8 is a transverse section taken on line 8—8 of Figure 1.

Figure 9 is a developed perspective view, partly broken away, and showing the device for holding

2

a plurality of headed bolts for being re-threaded by the use of the machine shown in Figure 1.

Figure 10 is a fragmentary top plan view of the device shown in Figure 9, with the parts thereof operatively assembled and holding a plurality of headed bolts.

Referring in detail to the drawings, the present apparatus includes a bolt re-threading machine as disclosed in Figures 1 to 8, inclusive, such machine including a substantially U-shaped frame 5 having a pair of spaced bearings 6 at each end and a further bearing 7 midway between its ends. The bearings 6 project inwardly and are preferably of U-shape so as to be open at their inner sides as at 8. A driven shaft 9 is journalled in each pair of bearings 6, and a pinion 10 is secured on each driven shaft 9 and disposed between the associated pair of bearings 6. A drive shaft 11 is journalled in the bearing 7 and is adapted to have its outer end connected to and driven by the power driven tool shaft of a drill press or like machine. For the latter purpose, the shaft 11 has a squared outer end 12 fitted and welded within the inner portion of the similarly shaped bore 13 of a polygonal head 14. The head 14 is adapted to be received and secured in the chuck of the power driven tool shaft of the machine with which the present threading machine is used, or the outer portion of the bore 13 forms a socket for reception of the driving end of a tool shaft of different type, a set screw 15 being provided to secure the head 14 on said end of the tool shaft. A gear 16 is secured on the inner end of the drive shaft 11 and disposed between and in mesh with the pinions 10 so as to maintain the driven shafts 9 in their bearings 6. The shaft 11 is longitudinally slidable in the bearing 7, and is releasably held with the head 14 adjacent the bearing 7 and with the gear 16 between the pinions 10 by means of a collar 17 having a set screw 18 which may be loosened to permit sliding of the shaft 11 outwardly. When the latter is done, the gear 16 will be withdrawn from between the pinions 10 so that the driven shafts 9 may be detached or withdrawn from the bearings 6, thereby facilitating compact storage of the machine when not in use. A reversal of this operation is had when the machine is assembled for use. A hollow die holder 19 is secured to the inner end of each driven shaft 9, which die holder has an axial bore 20 that opens into a larger polygonal socket 21 provided in the larger inner end portion 22 of said die holder. A re-threading die 23 is removably secured in the socket 21 of

each die holder, while a bolt guide ring **24** is fixed in the bore **20** of the die holder intermediate the ends of said bore. The guide ring **24** effectively guides the bolt being re-threaded so that it will be maintained truly axially of the die and holder during the re-threading operation, the bolt passing into the bore **20** as the operation proceeds. In order to hold the die **23** in place, a retaining plate **25** is bolted to the inner end of each die holder and is provided with a central opening **26** for the free passage of the bolt therethrough to the die **23**. The die holder **19** has ears **27** adapted to be registered with ears **28** of the retaining plate **25** for reception of bolts **29** by means of which the plate **25** is secured in place to retain the die **23** within the socket **21**. Each die holder **19** is provided at its outer end with a reduced polygonal shank **30** removably fitted in a similar socket **31** provided in the inner end of the associated driven shaft **9**, and a cross bolt **32** is extended through the shank **30** and the shaft **9** to secure the die holder to its driven shaft. It will be apparent that the die holders may be readily removed so as to permit the interchangeable use of die holders of different sizes. Also, the dies may be removed from the die holders so as to permit the interchangeable use of a limited number of different sized dies with each die holder, thereby adapting the machine for use in connection with bolts of different sizes.

When the present machine is used for re-threading stud bolts anchored in a machine frame or other structure, driving engagement is effected between the shaft **11** and the power driven tool shaft of a drill press or like machine. The present machine is then fed downwardly relative to the bolts as the shaft **11** is rotated for turning the die holders **19** in the same direction as indicated by the arrows in Figure 2. Two adjacent stud bolts *a* anchored in a machine frame *b* may thus be simultaneously re-threaded by use of the machine as shown in Figure 1, each stud bolt *a* passing into and being rethreaded by the die **23** of a different one of the two die holders **19**. Different models of the present machine may be provided for use in connection with existing structures having stud bolts spaced a predetermined distance apart, so that the die holders **19** will be properly spaced for simultaneously acting upon any two of the stud bolts of that particular existing machine or structure. Upon completion of the re-threading operation, the dies **23** may be threaded off of the stud bolts by simply reversing the direction of rotation of the tool shaft so that the shafts **11** and **9** will be reversely driven. The machine has been found especially useful in re-threading the stud bolts of conventional superheater headers and of economizer heads.

In order to adapt the present machine for use in rethreading headed bolts which are not anchored in a machine frame or other structure as is the case with stud bolts, I have provided a special form of bolt holding device as shown in Figures 9 and 10. This bolt holding device includes an elongated bar **35** adapted to be mounted edgewise vertically and in a horizontal position upon an end of the top of a bench or the like, said bar being provided with depending end leg extensions **36** formed with enlarged lower ends **37** provided with apertures **38** through which screws may be passed and threaded into the edge of the bench top for rigidly mounting the bar in position for use. The bar **35** is provided with a longitudinal series of uniformly spaced openings **39**

for the passage therethrough of the stems of the bolts **40** to be re-threaded, the spacing of the openings **39** corresponding to the spacing of the die holders **19** of the re-threading machine. The bar is provided on the back thereof with a plurality of equally spaced projecting flat sided lugs **41**. An opening **39** is provided centrally between each pair of adjacent lugs **41**, and the latter are so spaced as to snugly receive the heads of the bolts **40** therebetween with the flat adjacent sides of adjacent lugs **41** engaging opposite sides of the bolt heads so as to effectively restrain the bolts against turning while being re-threaded. In order to firmly hold the bolts in place with the heads thereof between adjacent ones of the lugs **41** and so that the bolts may not be forced backwardly out of the openings **39** during the re-threading operation, a clamping bar **42** is bolted to the back of the bar **35** so as to extend across the lugs **41** and the heads of the bolts **40** as illustrated in Figure 10. The bars **35** and **42** are provided with a plurality of openings as respectively indicated as **43** and **44** for reception of clamping bolts as illustrated at **45** in Figure 10, whereby to effectively bolt the bar **42** to the bar **35** at the back of the latter for securing the bolts **40** in place as above described. In this way and by this means, a plurality of the bolts **40** may be supported and held in pairs for being successively re-threaded by use of the machine shown in Figure 1. After the re-threading operation has been completed in connection with all of the bolts supported and held by the device shown in Figures 9 and 10, the bar **42** may be unbolted from the bar **35** so as to permit removal of the re-threaded bolts **40** from said bar **35**.

From the foregoing description, it is believed that the construction, operation and advantages of the present invention will be readily understood and appreciated by those skilled in the art. Minor changes may be made in details of construction illustrated and described, such as fall within the scope of the invention as claimed.

What I claim is:

1. In a bolt re-threading apparatus, a re-threading machine comprising a substantially U-shaped rigid frame having a pair of forked inwardly facing spaced and aligned integral bearings at each end and a further integral bearing midway between its ends, a driven shaft journalled in each pair of bearings, a pinion secured on each driven shaft between the associated pair of bearings, a drive shaft journalled and longitudinally slidable in said further bearing and having an outer end adapted for driving connection with the power driven tool shaft of a machine, a gear secured on the inner end of said drive shaft and disposed between and meshing with the pinions of the driven shafts, a hollow die holder secured to the inner end of each driven shaft, and a bolt re-threading die secured in the inner end of each die holder.

2. The structure defined in claim 1, wherein each driven shaft is provided with a polygonal socket at its inner end, each die holder having a reduced polygonal shank at its outer end removably received in the socket of the associated driven shaft, and means operatively associated with and removably securing the shank of each die holder in the socket of its associated driven shaft.

3. In a bolt re-threading apparatus, a re-threading machine comprising a substantially U-shaped rigid frame having a pair of inwardly projecting spaced and aligned integral bearings at

each end and a further integral bearing midway between its ends, said spaced bearings being forked and open at the inner sides thereof, a driven shaft journalled in each pair of bearings and removable from the latter upon being shifted laterally inwardly, a pinion secured on each driven shaft between the associated pair of bearings, a drive shaft journalled and longitudinally slidable in said further bearing and having an outer end adapted for driving connection with the power driven tool shaft of a machine, a gear secured on the inner end of said drive shaft and disposed between and meshing with the pinions of the driven shafts, means operatively associated with and releasably securing the drive shaft against longitudinal movement relative to the frame, said last-named means being releasable to permit outward longitudinal movement of said drive shaft so as to withdraw the gear from between the pinions and permit the removal of the

drive shafts with their pinions from said spaced bearings, a hollow die holder secured to the inner end of each driven shaft, and a bolt re-threading die secured in the inner end of each die holder.

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