Dec. 7, 1954 C. DODEGGE 2,696,044

NIBBLER

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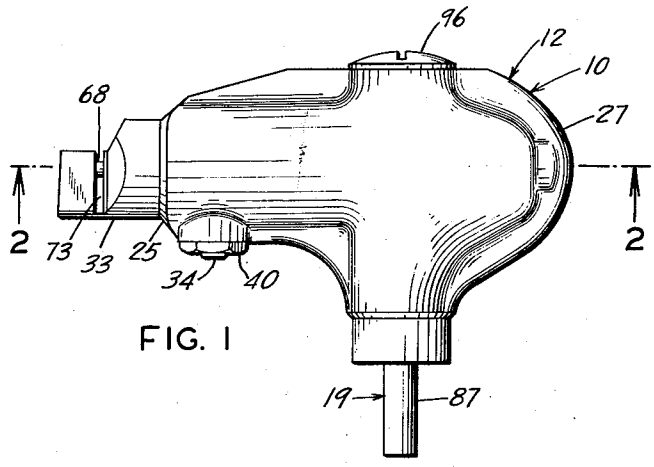
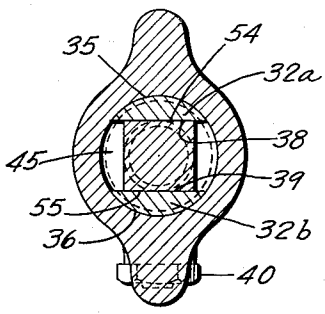


FIG. 1

FIG. 4



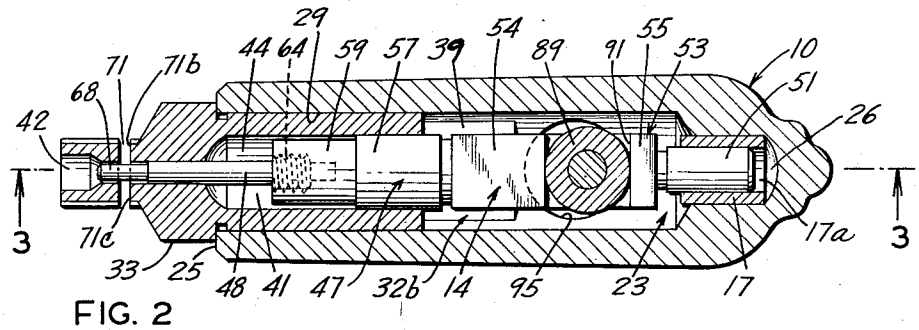


FIG. 2

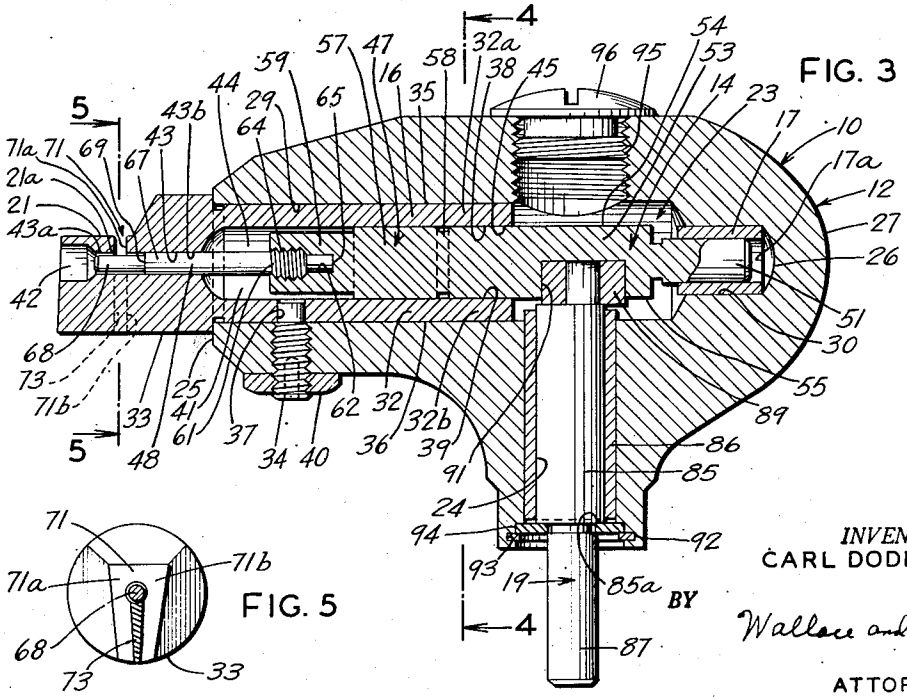


FIG. 3

FIG. 5

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NIBBLER

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5 Claims. (Cl. 30—241)

This invention relates to shearing attachments for portable power units and, more particularly, to nibblers for attachment to portable power units such as electric drills, and the like.

Nibblers of the general character to which my invention relates have been heretofore known in the art. However, the nibblers previously known have had certain inherent disadvantages such as, for example, being of relatively complicated construction; and embodying constructions wherein the punch of the nibbler was not efficiently supported, and the like.

The primary object of my invention is to afford a novel nibbler wherein the punch thereof is firmly and positively held against undesired movement in a novel and expeditious manner.

Another object is to so construct a novel nibbler that the punch is supported in bearings at both ends in a novel and expeditious manner.

A further object of my invention is to afford such a nibbler wherein a shear plate or cutter blade may be embodied, in a novel manner, as an integral part of one of the aforementioned bearings which may be quickly and easily inserted in, and withdrawn from, the housing of the nibbler.

Yet another object of my invention is to afford a nibbler embodying novel and efficient bearings of the aforementioned character, wherein the bearings and the openings therein are constructed in a novel and expeditious manner, whereby the commercial production of the bearing is facilitated, and the assembly of the bearing in the nibbler unit may be quickly and easily effected.

A further object is to afford a nibbler which is relatively small in size, but which affords an effective attachment for electric hand drills and the like, and which is efficient in operation and may be readily and economically produced commercially.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawing which, by way of illustration, shows a preferred embodiment of the present invention and the principle thereof and what I now consider to be the best mode in which I have contemplated applying that principle. Other embodiments of the invention embodying the same or equivalent principle may be used and the structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is a side elevational view of a nibbler embodying the principles of my invention;

Fig. 2 is a longitudinal, sectional view, taken substantially along the line 2—2 in Fig. 1.

Fig. 3 is a longitudinal, sectional view taken substantially along the line 3—3 in Fig. 2;

Fig. 4 is a sectional view taken substantially along the line 4—4 in Fig. 3; and

Fig. 5 is a detail sectional view taken substantially along the line 5—5 in Fig. 3.

A nibbler **10** is shown in the drawings to illustrate the preferred embodiment of my invention.

As is best seen in Fig. 3, the nibbler **10** comprises, in general, a housing **12** in which a ram or plunger **14** is reciprocably mounted in bearings **16** and **17**, the plunger **14** being connected to a drive unit **19** for reciprocation relative to a shear plate or blade **21**, all of which will be discussed in greater detail presently.

The housing **12** is preferably a one-piece casting having two interconnecting chambers **23** and **24**, Fig. 3, therein. The chamber **23** affords the opening in which the ram **14** is mounted, and the chamber **24** affords the opening in which the drive unit **19** is mounted for connection to the ram **14**, as will be discussed in greater detail presently.

The chamber **23** extends longitudinally of the housing **12** from the front wall **25** and terminates in a closed end **26** in spaced relation to the outer surface of the rear wall **27** of the housing **12**. Throughout the major portion of its length, the chamber **23** comprises a substantially cylindrically shaped portion or chamber **29** having a uniform bore. However, the rear end portion of the chamber **23** is of substantially less cross sectional size than the chamber **29**, to thereby afford a rear bearing chamber **30** of considerably reduced cross section.

The bearing **16** comprises an elongated member having a substantially cylindrical shape shank **32**, on one end of which is mounted an enlarged head **33**, and from the other end of which project two diametrically opposed, and substantially parallel ears **32***a* and **32***b*, Figs. 2 and 3.

The bearing **16** is mounted in the housing **12** with the shank **32** and the ears **32***a* and **32***b* disposed in snug engagement with the walls of the chamber **29**, and with the enlarged head **33** disposed in abutting relation to the front wall **25** of the housing **12**.

The bearing **16** is releasably secured in the housing **12** by means of a screw **34** which extends through a portion of the housing **12** into an opening **37** of substantially the same size and shape in the bearing **16**. The screw **34** is held in proper adjusted position by suitable means such as a lock-nut **40**.

The outer surfaces **35** and **36** of the ears **32***a* and **32***b*, respectively, Fig. 4, are arcuate in shape, conforming substantially to the circular shape of the walls of the chamber **29** to afford a good bearing surface thereagainst. The inner surfaces **38** and **39**, respectively, of the ears **32***a* and **32***b* are flat and substantially parallel to each other to thereby, together with the adjacent portion of the walls of the chamber **29**, define a slot **45** of quadrangular cross-section and having two opposite sides which are flat and substantially parallel afforded by the inner surfaces **38** and **39** of the ears **32***a* and **32***b*.

Forwardly of the slot **45**, an opening **41** extends longitudinally through the bearing **16**, Figs. 2 and 3, to receive the ram or plunger **14** as will be discussed in greater detail presently. The opening **41** varies in cross sectional size and shape at different portions of its length. Thus, it will be seen that in the front end portion of the bearing **16**, the opening **41** is in the form of an open ended recess **42** of substantially circular cross section. Immediately behind the recess **42**, and inter-connected therewith, the adjacent portion of the opening **41** comprises a passageway **43** of substantially circular shaped cross section, the passageway **43** being of reduced cross section from that of recess **42**. The next portion of the opening **41**, immediately behind the passageway **43**, comprises a passageway **44** of substantially circular shaped cross section, and the cross section of this passageway **44** is substantially greater than that of either the recess **42** or passageway **43**. The passageway **44** is axially aligned with the slot **45** and the diameter thereof is of the same length as the distance between the inner surfaces **38** and **39** of the ears **32***a* and **32***b*.

The plunger **14**, which is reciprocably mounted in the bearings **16** and **17**, embodies an elongated block **47**, in one end of which is mounted a punch **48**. Like the opening of **41** in the bearing **16**, the block **47** varies in cross sectional shape and size throughout its length. Thus, it will be seen that the inner end portion **51** of the block **47** is substantially circular shaped in cross section and fits relatively snugly into the correspondingly circular shaped opening **17***a* in the bearing **17**. Immediately forward of the inner end portion **51** of the block **47**, an intermediate portion **53**, of substantially square cross section, is disposed. This latter portion of the block **47** is of such size that the upper and lower faces **54** and **55** thereof engage the inner faces **38** and **39**, of the ears **32***b* and **32***c* of the bearing **16**, Fig. 4.

Another portion **57** of the block **47** is disposed forwardly of the square portion **53** thereof, and is con-

nected thereto by a connecting portion **58** of reduced cross sectional size. This other portion **57** is circular in cross section, and is of a size corresponding to the cross sectional size of the passageway **44** in the opening **41**, to afford a bearing surface which fits relatively snugly in the passageway **44**. The forward end portion **59** of the block **47** projects forwardly from the circular portion **57**, and is preferably of the circular shape, but is of reduced cross section so that it does not engage the sides of passageway **44**.

With this construction of the block **47**, it will be seen that this member may be readily constructed of bar stock, the portions **51**, **57**, **58** and **59** being readily turned on a lathe, or the like, and the portion **45** being readily machined by means of a shaper, a milling machine, or the like. In this latter connection it will be noted that the reduced portion **58** of the block **47** affords sufficient clearance between the square portion **45** and the circular portion **57** to enable proper shaping of the square portion **45** without striking the portion **57**, which, it will be remembered is of the same cross sectional size.

A recess having an internally threaded enlarged portion **61** and a reduced inner portion **62** is formed in front end portion of the end portion **59** of the block **47**, Fig. 3, for reception of one end portion of the punch **48** as will be presently explained.

The punch **48** has an inner end portion **65** and a major body portion **67** of the same cross-sectional size separated by an enlarged threaded portion **64** disposed therebetween, Fig. 3. The threads **64** and the inner end portion **65** of the punch **48** are so constituted and arranged that when the threads **64** are screwed into operative position in the threaded recess **61** in the block **47**, the inner end **65** of the punch **48** fits snugly into the recess **62** and abuts the inner end of the recess **62**, to thereby firmly and positively support the punch **48** against movement relative to the block **47**. This, it will be seen, positively holds the punch **48**, and also protects the threads **64** against the stresses encountered in the operation of the punch.

Forwardly of the block **47**, the main body portion **67** of the punch **48** is slideably mounted in the passageway **43** of the bearing **16**, and fits relatively snugly therein. The forward end portion **68** of the punch **48** is of somewhat smaller cross section than the main body portion **47**, and thereby affords a forwardly facing shoulder **69** at the junction of the end portion **68** and the body portion **67**, Fig. 3. This shoulder **69** forms the cutting edge of the punch **48**, as will be presently explained.

Between the ends of the passageway **43**, a substantially inverted U-shaped slot **71** is formed in the enlarged head **33** on the bearing **16**. The slot **71** has an upwardly opening top portion **71***a*, Fig. 3, and two laterally opening legs **71***b* and **71***c*, Fig. 2, projecting downwardly from the top portion **71***a*. The top portion **71***a* extends transversely across the upper forward portion of the enlarged head **33** immediately above a relatively narrow flange **73**, Figs. 3 and 5, which connects the shear plate **21** to the main body portion of the enlarged head **33**, and the outwardly opening legs **71***b* and **71***c*, which project downwardly from the top portion **71***a*, are disposed on opposite sides of the flange **73**, Fig. 2.

As is best seen in Figs. 3 and 5, the flange **73** is vertically aligned with the passageway **43** and is disposed immediately therebelow with the upper edge of the flange **73** disposed tangentially to the passageway **43**. Thus, the top portion **71***a* of the slot **71** separates the passageway **43** into a forward end portion **43***a* disposed in the shear plate **21**, and a rear end portion disposed in the main body portion of the enlarged head **33**, Fig. 3.

The forward end portion **68** of the punch **48**, which is of sufficiently reduced cross section that it does not engage the side-walls of the passageway **43**, is of such length that, when the ram **14** is in fully retracted position as shown in Fig. 3, the end portion **68** is disposed in both the forward end portion **43***a* and the rear end portion **43***b* of the passageway **43** with the shoulder **69**, between the portions **67** and **68** of the punch **48**, disposed in retracted position in the rear end portion **43***b* of the passageway **43**. When the ram **14** is moved into full forwardly disposed position, upon rotation of the drive unit **19**, as will be presently explained, the punch **48** is so positioned thereby that the main body portion **67** thereof extends into the forward end portion **43***a* of the passageway **43** sufficiently to carry the shoulder **69** forwardly past the shearing edge **21***a* on the shear plate **21**, the shearing edge **21***a* being that rear edge portion of the shearing plate which defines the rear end of the forward portion **43***a* of the passageway **43**. It is this movement of the shoulder **69** past the shearing edge **21***a* which effects shearing of work pieces fed into the slot **71** of my novel nibbler during operation of the latter as will be presently discussed.

The drive mechanism **19**, by which the plunger **14** is reciprocated in the bearings **16** and **17**, comprises a drive shaft **85** journaled in a bearing **86** mounted in the chamber **24**. One end portion **87** of the drive shaft **85** projects outwardly from the housing **12** to afford a coupling member by which the drive shaft **85** may be connected to a portable hand type power tool such as, for example, an electric drill, or the like, the coupling member **87**, in operation, being engaged in the jaws of the chuck on such a drill.

A roller **89** is eccentrically mounted on the inner end of the drive shaft **85**, and is disposed in a slot **91**, formed in, and extending transversely across, the lower face of the square portion **53** of the block **47**, Figs. 2 and 3. Thus it will be seen that on rotation of the drive shaft **85**, the roller **89**, through its connection with the block **47**, is effective to reciprocate the plunger **14** in the bearings **16** and **17**. The roller **89** is so disposed on the drive shaft **85** that upon a complete rotation of the latter, the roller is effective to reciprocate the ram **14** between the aforementioned fully retracted position wherein the punch **48** is disposed in the position shown in Fig. 3, and the aforementioned full forwardly disposed position wherein the shoulder **69** is disposed forwardly of the shearing edge **21***a*.

The drive shaft **85** is releasably secured in the housing **12** by a snap-ring **92** mounted in a groove or slot **93** in the outer end portion of the chamber **24** in the housing **12**, the snap-ring **92** being engaged with a washer **94** disposed in abutting engagement with an outwardly facing shoulder **85***a* on the drive shaft **85**.

An opening **95** is provided through the top of the housing **12** which communicates with the chamber **41**, and affords means by which suitable lubricants such as, for example, grease, may be inserted in the chamber **41** to thereby lubricate the plunger **14** and the drive shaft **85**. A screw plug **96** is mounted in the opening **95** to afford a removable cover for the opening.

In the operation of my novel nibbler **10**, the coupling member **87** may be mounted in the chuck of a portable hand drill, or the like, and the drive shaft **85** driven thereby. As previously mentioned, the rotation of the drive shaft **85** is effective to reciprocate plunger **14**, and therefore to reciprocate the cutting edge **69** on the punch **48** back and forth across the shearing edge **21***a* on the shear plate **21**.

The work to be cut, such as, for example, tin or other suitable sheet metal, may then be fed downwardly into the top portion **71***a* of the slot **71** into engagement with the side of the punch **48**. With the punch **48** being reciprocated by the drive unit **19**, the movement of the shoulder **69** thereon past the shearing edge **21***a*, is effective to cut into the work piece. The shoulder **69** on the punch **48** is relatively narrow, being preferably on the order of fifteen-hundredths of an inch, and therefore, it will be seen that the shearing of the work-piece is accomplished by a rapid series of relatively small cuts or "bites."

The flange **73** is gradually tapered inwardly from the top toward the bottom, as is best seen in Fig. 5, which enables the nibbler **10** to be readily turned during a nibbling operation for following a tortuous cutting line.

In such shearing operations of my novel device, it will be seen that the ram **14** is positively and efficiently supported against transverse movement at the rear end thereof by the portion **51** disposed in the bearing **17**; at the central portion by the portions **53** and **57** disposed in the slot portion **45** and the passageway **44**, respectively, of the bearing **16**; and at the forward end portion by the body portion **67** of the punch **48** disposed in the passageway **43** in the bearing **16**.

Also, it will be seen that the ram **14** is also positively and effectively held against rotation in the housing **12** during operation of my novel nibbler **10** by the engagement of the square portion **53** of the block **47** with the ears **32***b* and **32***c*, and the positive securing of the bear-

ing **16** by the screw **34** disposed in the housing **12** and the opening **37**.

In addition, it will be seen that the punch **48** is positively and effectively supported in the block **47** of the ram **16** against both lateral and longitudinal movement relative thereto by its combination threaded and abutting engagement therein.

In addition to being effective and efficient in operation, my novel nibbler **10** is so constituted and arranged that it may be readily and economically manufactured commercially and may be quickly and easily assembled and disassembled.

Thus, for example, it will be seen that the housing **12** may be readily constructed as a one-piece casting, and the other parts thereof may be readily constructed of readily available stock, the aforementioned other parts being so constructed that the necessary machining operations thereon may be readily accomplished.

Also, for example, in assembling my novel nibbler, the bearings **17** and **86** may be first inserted into position; the punch **48** may be screwed into the block **47**; the ram **14** may then be inserted forwardly into the bearing **16**; the bearing **16** and the ram **14** may then be slipped rearwardly into position in the housing **12**; the screw **34** and lock nut **40** may then be placed in position; the drive unit **19** may then be inserted into position in the housing **12**; and the washer **94** and the snap-ring **93** may then be placed in operative position.

From the foregoing it will be seen that I have afforded a novel nibbler which may be readily constructed, is quickly and easily assembled and disassembled, and which is effective and efficient in operation.

Hence, while I have illustrated and described the preferred embodiments of my invention, it is to be understood that these are capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims:

I claim:

1. A shearing attachment for a portable hand-type power tool or the like, comprising a housing, two spaced bearings mounted in said housing, an elongated plunger reciprocably mounted in said bearings, said plunger having two oppositely disposed end portions with each of said end portions mounted in and supported by a respective one of said bearings, a shear blade mounted on one of said bearings, said plunger including a punch projecting outwardly from said housing toward said blade and being reciprocable relative to said blade upon reciprocation of said plunger in said bearings, and means operatively connected to said plunger for drivingly connecting said plunger to such a power tool for so reciprocating said plunger.

2. A shearing attachment for a portable hand-type power tool or the like, comprising a housing, two bearings mounted in said housing, one of said bearings being removably mounted in said housing and having a shear blade mounted on one end portion thereof outwardly of said housing, a plunger reciprocably mounted in said bearings, said plunger including a punch projecting outwardly from said housing toward said blade and reciprocable relative to said blade upon reciprocation of said plunger in said bearings, and means mounted in said housing and connected to said plunger for operatively connecting said plunger to such a power tool for reciprocating said plunger.

3. A shearing attachment for a portable hand-type power tool or the like, comprising a housing, two spaced bearings mounted in said housing, an elongated plunger reciprocably mounted in said bearings, said plunger having two oppositely disposed ends with each of said ends mounted in and supported by a respective one of said bearings, a shear blade mounted on one of said bearings, said plunger comprising a block slidably mounted in said bearings, and a punch removably mounted in said block and projecting outwardly from said housing toward said blade, said block having a recess formed therein, and said punch having one end portion threadedly engaged with said block in said recess and having the end extremity of said end portion disposed in abutting relation to a portion of said block, and means operatively connected to said block for drivingly connecting said block to such a power tool for reciprocating said block and said punch relative to said blade.

4. A nibbler for attachment to a portable hand tool and comprising a housing, two bearings mounted in said housing in spaced relation to each other, an elongated plunger reciprocably mounted in said bearings and projecting outwardly of said housing for reciprocation into and out of said housing, one end of said plunger being mounted in one of said bearings, said plunger having another end portion of substantially circular cross-section and an intermediate portion of quadrilateral cross-section, said intermediate portion having two flat substantially parallel sides, the other of said bearings having a substantially circular-shaped bearing portion supportingly engaged with said other end portion of said plunger and a slotted portion having two flat substantially parallel sides supportingly engaged with said intermediate portion of said plunger, means mounted on said other bearing and disposed outwardly of said housing and defining a shearing edge, means on said plunger defining a shearing edge, said last mentioned shearing edge being disposed on said plunger in position to reciprocate transversely to, and adjacent to, said first mentioned shearing edge upon said reciprocation of said plunger, and means connected to said plunger for drivingly connecting said plunger to such a hand tool for reciprocation thereby.

5. A nibbler for attachment to a portable hand-type tool such as an electric drill, or the like, comprising a housing, said housing having two elongated, outwardly opening, interconnected chambers disposed transversely to each other, two bearings mounted in one of said chambers in spaced relation to each other, one of said bearings being of elongated construction and being removably mounted in said one chamber and having an end portion projecting outwardly from said housing, said one bearing having an opening extending substantially axially through the length thereof, said opening having a longitudinally intermediate portion of substantially circular cross-section, said opening having an end portion disposed in said one end portion of said bearing and having a substantially circular-shaped cross-section of smaller diameter than said intermediate portion, said one bearing having another end portion mounted in said housing, said opening having a portion extending through said other end portion of said one bearing in the form of an open-sided slot having two substantially flat, parallel oppositely disposed side walls separated from each other a distance substantially equal to the diameter of said intermediate portion of said opening, an elongated plunger reciprocably mounted in said bearings for reciprocation toward and away from said one end portion of said one bearing, said plunger comprising an elongated block having one end portion of substantially circular cross-section and an intermediate portion of substantially quadrangular cross-section with two flat, substantially parallel sides, and an elongated punch of substantially circular cross-section mounted in said block and projecting therefrom, said plunger being mounted in said bearings with said one end portion of said block being journaled in said intermediate portion of said opening, said intermediate portion of said block being slidably mounted in said other end portion of said one bearing with said flat sides of said block disposed against said flat sides of said slot, and said punch being journaled in said portion of said opening disposed in said one end portion of said bearing, said one end portion of said bearing having a shearing edge disposed around said punch, said punch having a shoulder defining a shearing edge disposed thereon in spaced relation to the ends of said punch for reciprocation past said first mentioned shearing edge during said reciprocation of said plunger, and means connected to said plunger for operatively connecting the latter to such a portable tool for reciprocation thereby.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,201,599	Trautmann	May 21, 1940
2,217,393	Webb	Oct. 8, 1940