United States Patent [19]

Spencer-Foote

[11] **3,837,023**

[45] **Sept. 24, 1974**

[54] **MULTIPURPOSE IMPLEMENT FOR PERFORMING DESTRUCTIVE OPERATIONS**

[76] Inventor: **Ronald Spencer-Foote,** 2672 Hubbard St., Brooklyn, N.Y. 11235

[22] Filed: **Oct. 7, 1971**

[21] Appl. No.: **187,345**

[52] **U.S. Cl.** ..... **7/8.1 R,** 7/12, 306/32, 306/43

[51] **Int. Cl.** **B25f 1/02**

[58] **Field of Search** ..... 306/1.6, 6, 28, 30, 32, 306/43; 7/12, 14.1 R, 8.1 R

[56] **References Cited**

UNITED STATES PATENTS

1,287,446	12/1918	Ryan	306/6
1,398,342	11/1921	Pleaue	306/30
3,219,316	11/1965	Fried	7/12
3,473,712	10/1969	Genchi	7/8.1 R
3,623,173	11/1971	Hagquist	7/8.1 R
3,694,918	10/1972	Bailey	7/12

FOREIGN PATENTS OR APPLICATIONS

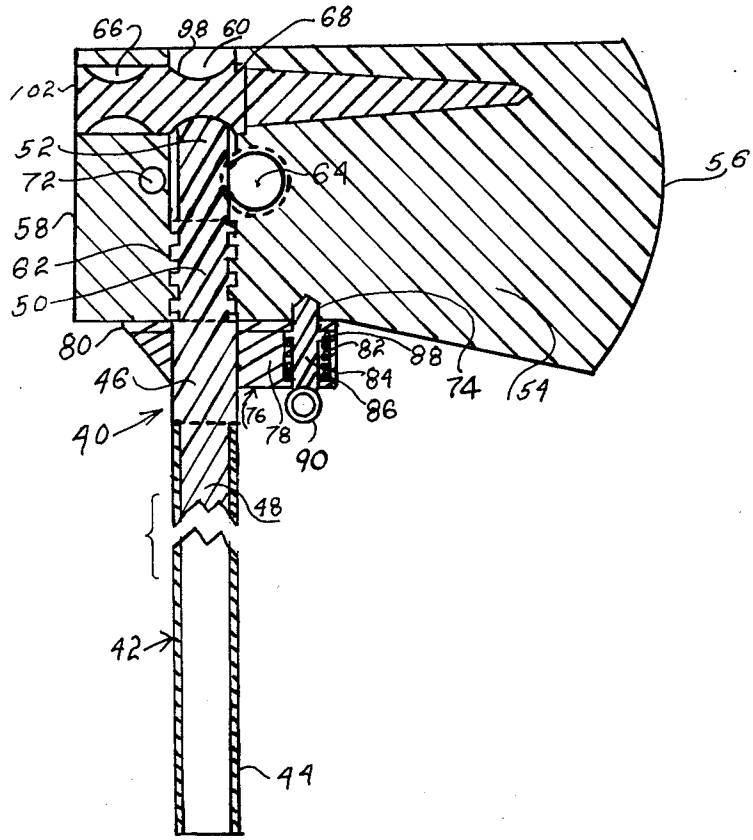
32,797	5/1912	Sweden	7/8.1 R

Primary Examiner—Al Lawrence Smith
Assistant Examiner—Roscoe V. Parker
Attorney, Agent, or Firm—Steinberg & Blake

[57] **ABSTRACT**

A multipurpose implement for carrying out destructive operations such as cutting, tearing, breaking, and the like. The implement includes an elongated handle assembly for transmitting forces such as impact forces, wedging forces, pushing forces, pulling forces, twisting forces, and the like. A plurality of tools are available for selective connection with the handle assembly to receive the above forces therefrom, these tools being capable of carrying out operations such as wood-cutting and wood-breaking operations, metal-cutting and metal-tearing operations and lock-pulling as well as lock-breaking operations. A connecting structure is carried on the one hand by the handle assembly and on the other hand by each of the tools for selectively connecting the tools to the handle assembly, at least some of the tools being capable of connection with the handle assembly in a number of different positions, and at least some of the tools being capable of being connected simultaneously to the handle assembly. Also, at least some of the tools are capable of connection simultaneously to the handle assembly in a selected one of a number of different positions with respect to each other. The tools which can be selectively connected either separately or simultaneously to the handle assembly include an axe-head, capable also of functioning as an adze, a pike, a sheet-metal cutter capable also of functioning as a plaster and lath breaker, and a lock puller, with the axe-head in certain positions also having a chisel function.

7 Claims, 33 Drawing Figures



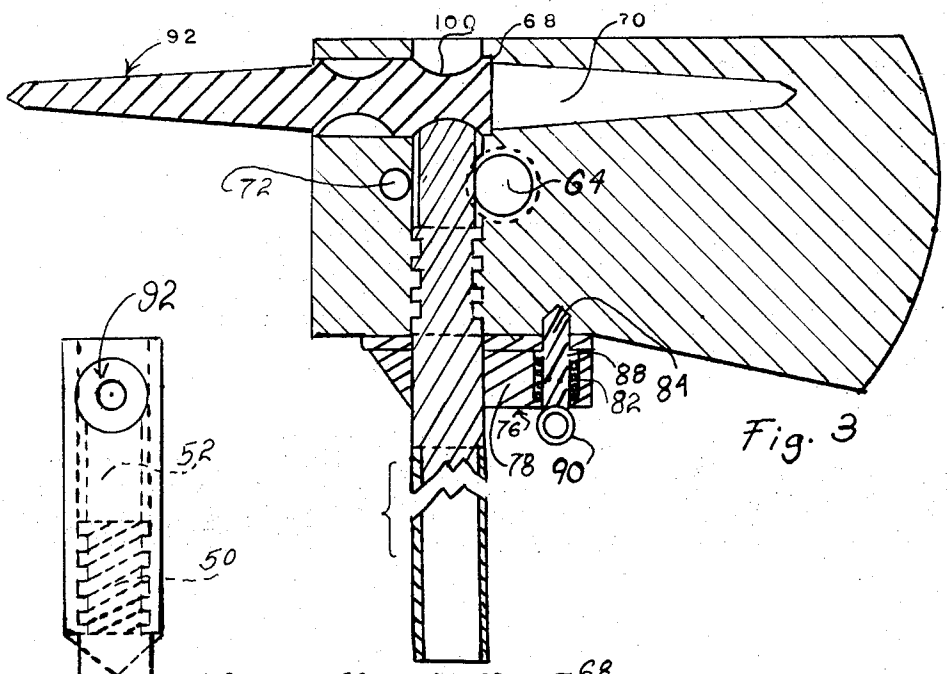


Fig. 3

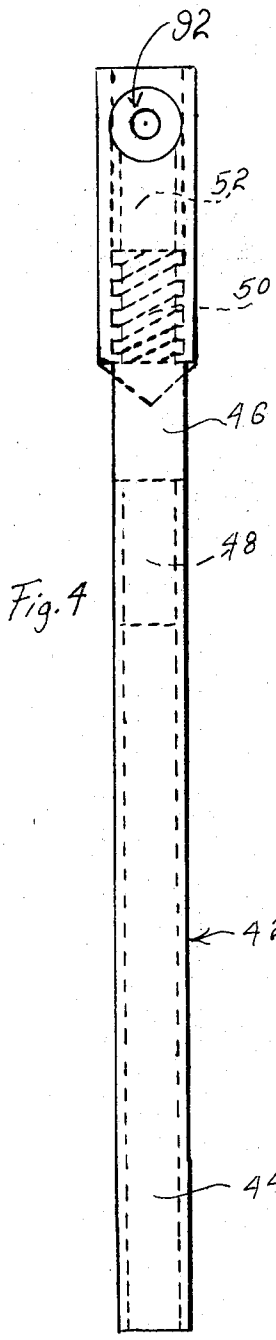


Fig. 4

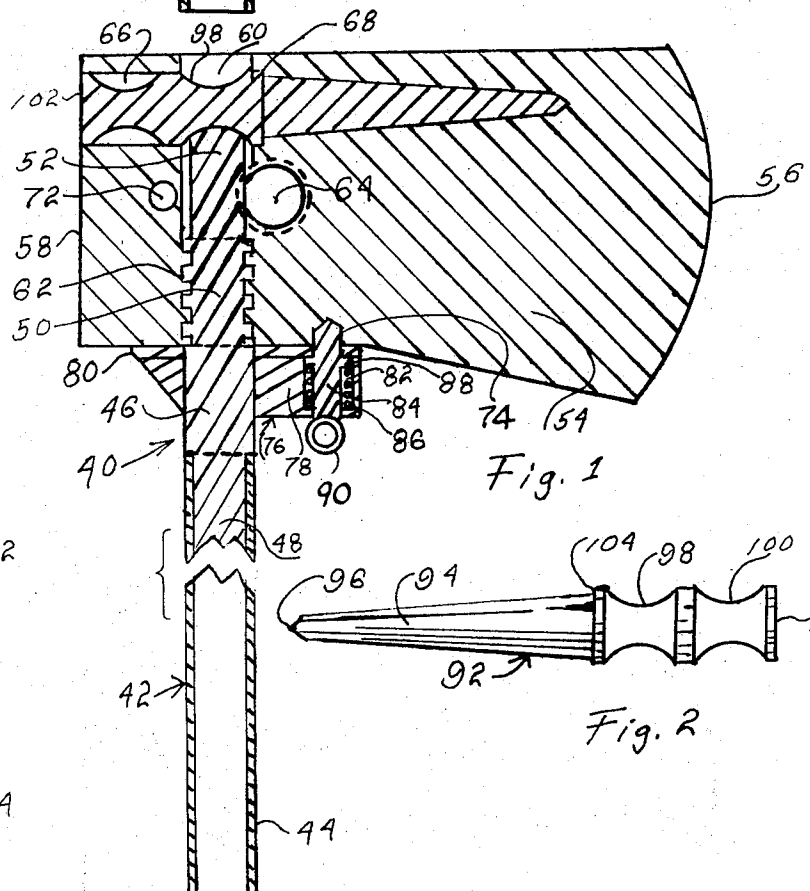


Fig. 1

Fig. 2

INVENTOR
Ronald Spencer Foote
BY Steinberg & Blake
ATTORNEYS

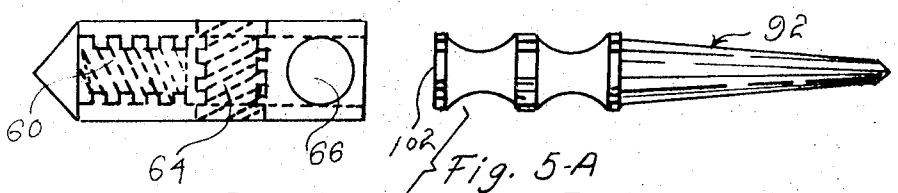


Fig. 5-A

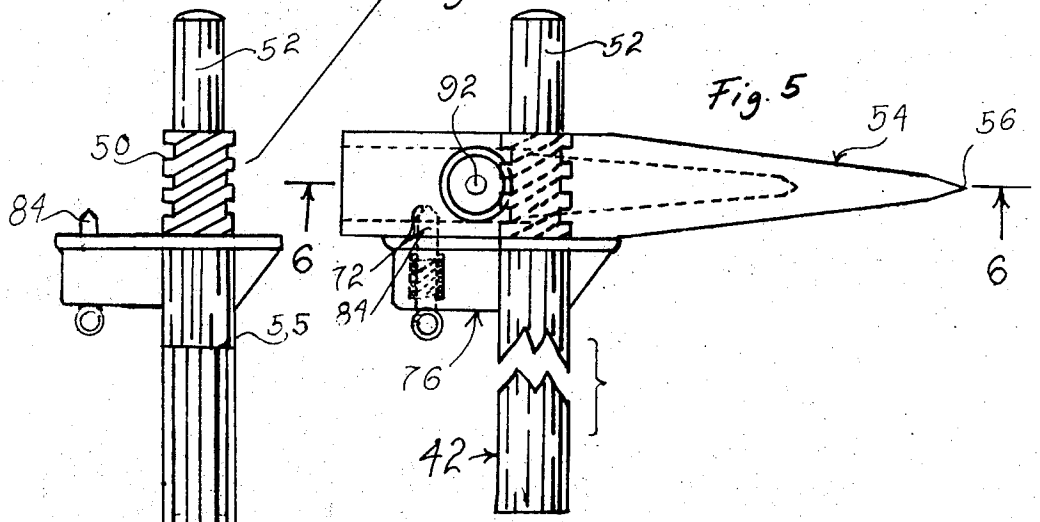


Fig. 5

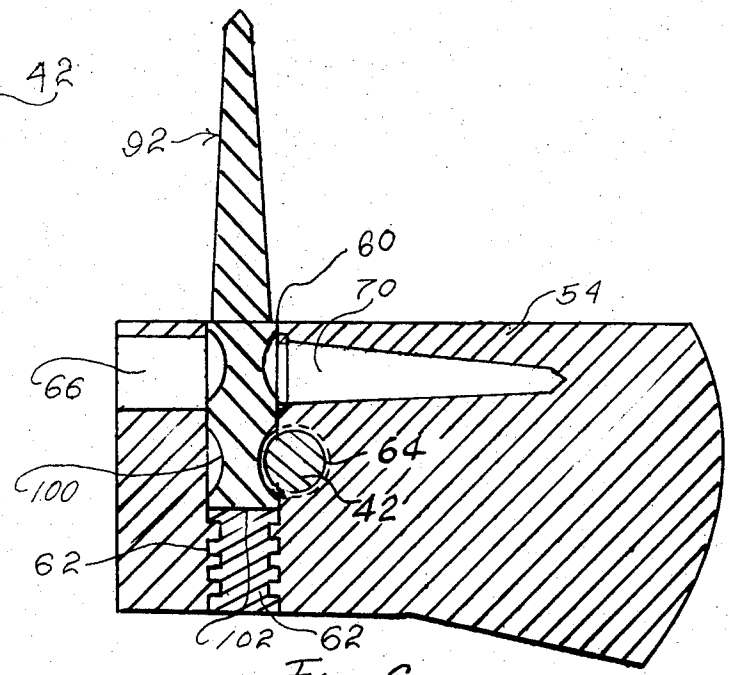


Fig. 6

INVENTOR
Ronald Spencer-Foots
BY Steinberg & Blake
ATTORNEYS

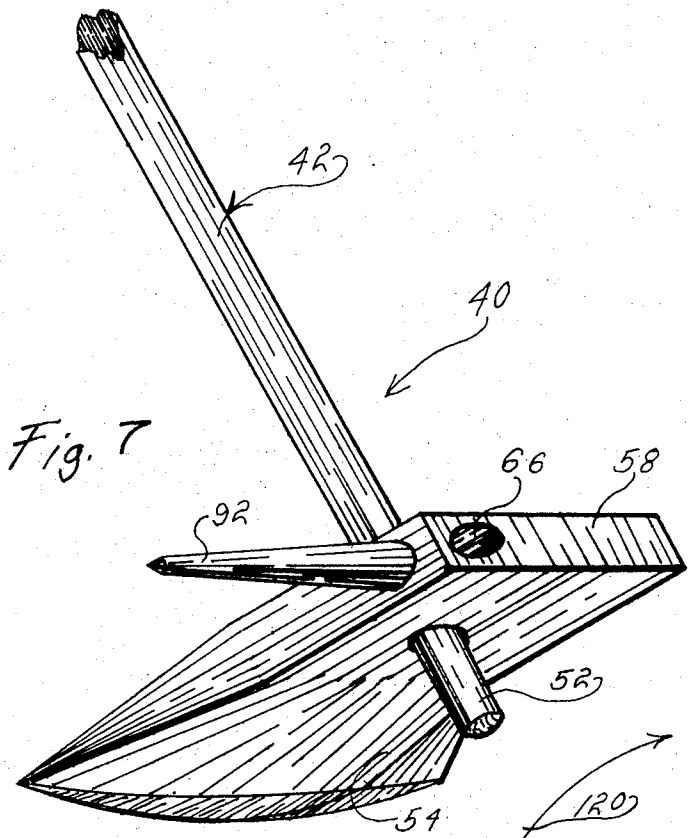


Fig. 7

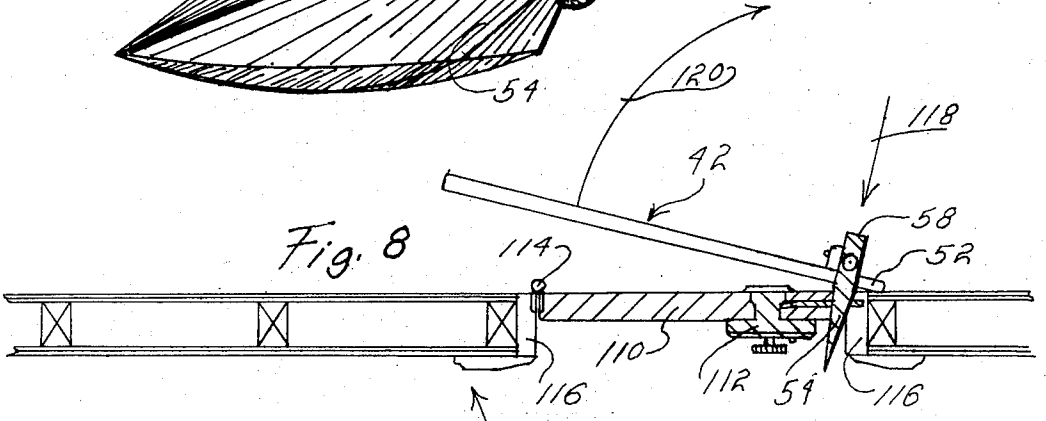


Fig. 8

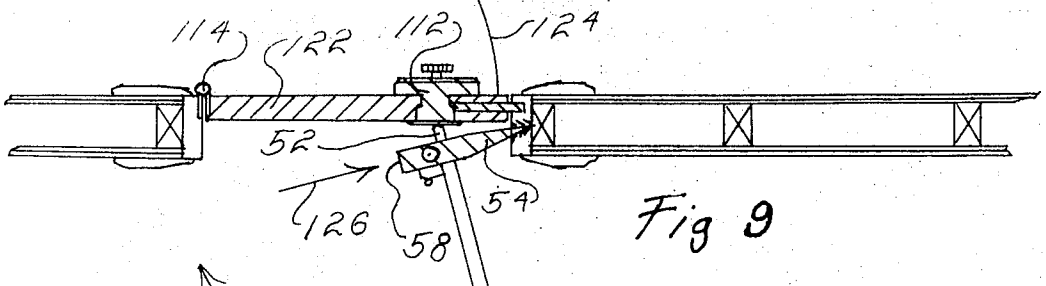
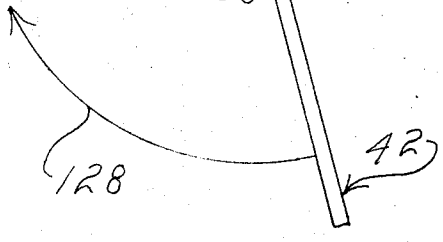


Fig 9



INVENTOR
Ronald Spencer Foote
BY Steinberg & Blake
ATTORNEYS

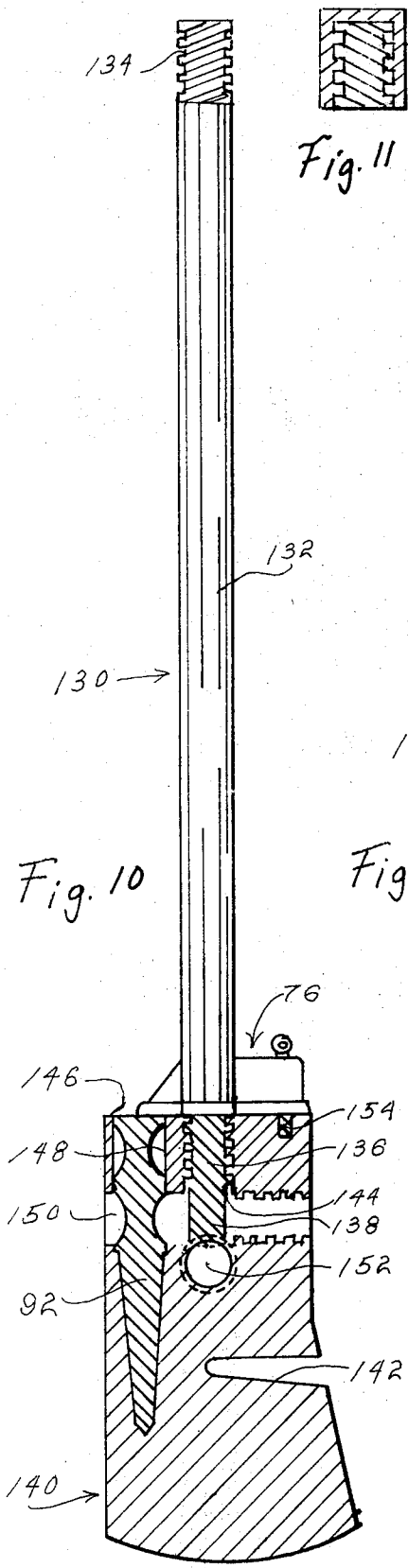


Fig. 10

Fig. 11

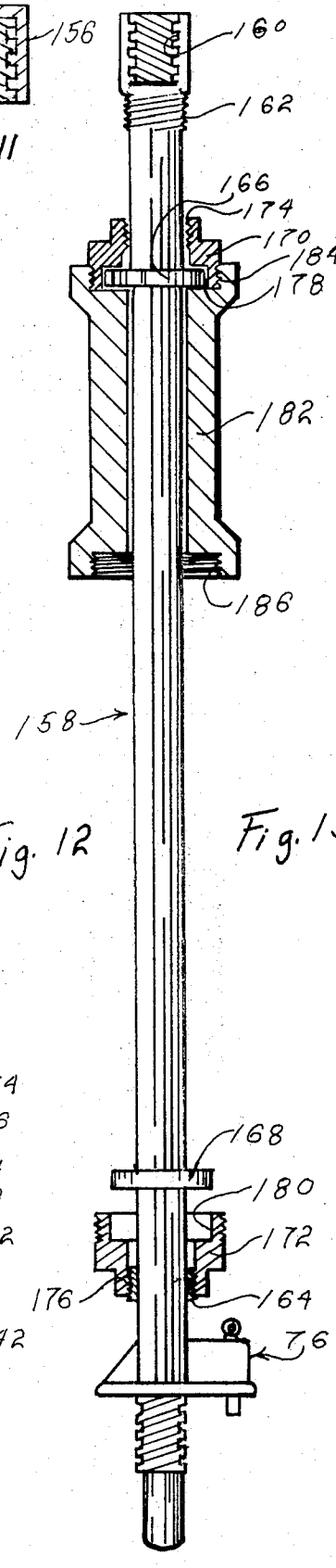


Fig. 12

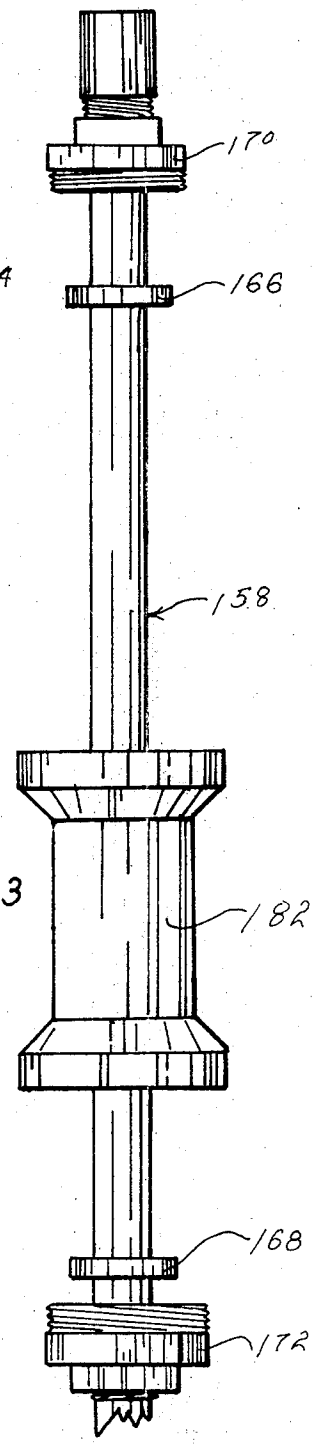


Fig. 13

INVENTOR
Ronald Spencer-Foots
BY Steinberg & Blake
ATTORNEYS

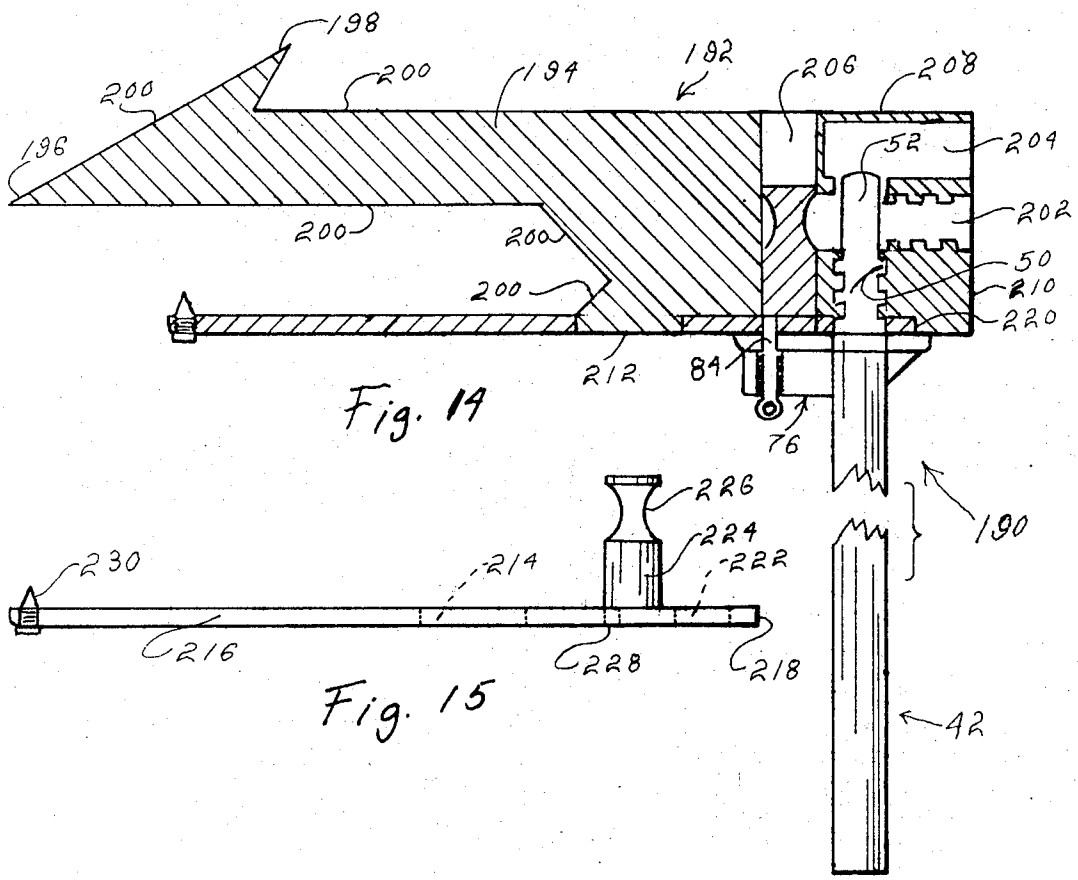


Fig. 14

Fig. 15

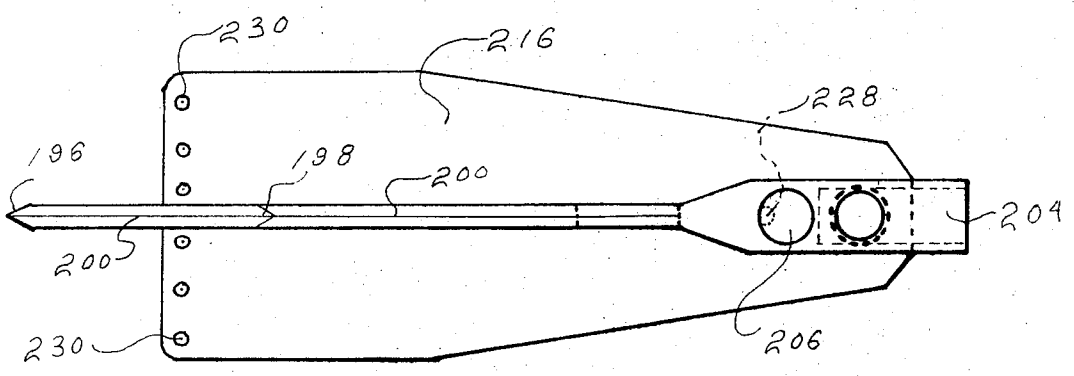


Fig. 16

INVENTOR
Ronald Spencer-Foote
BY Steinberg & Blake
ATTORNEYS

Fig. 17

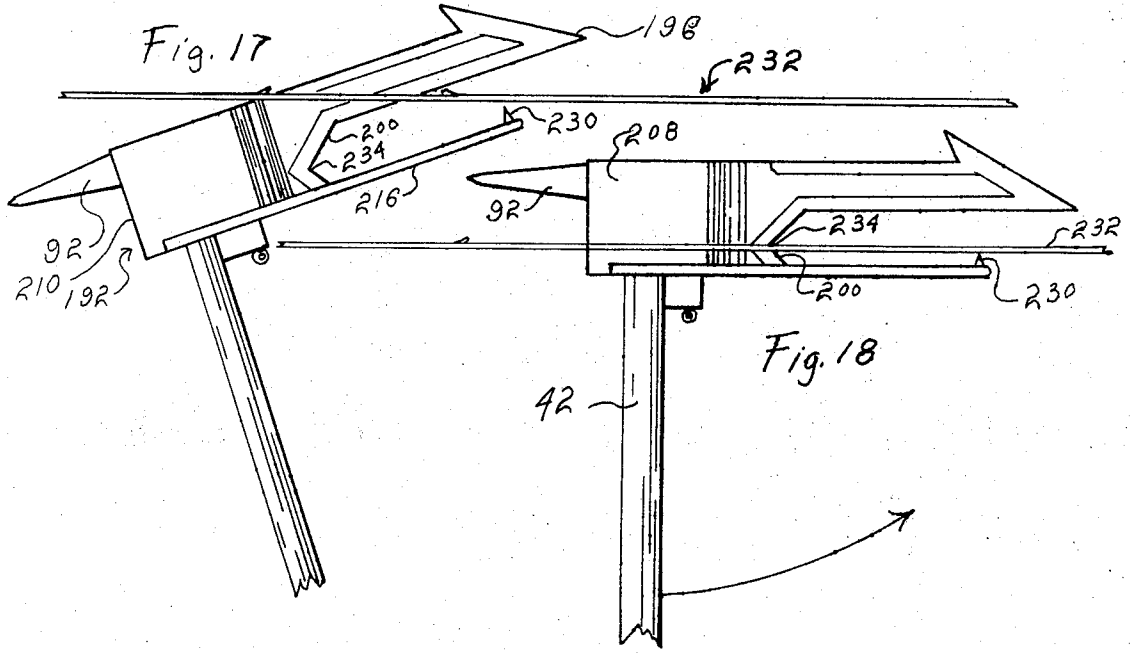


Fig. 18

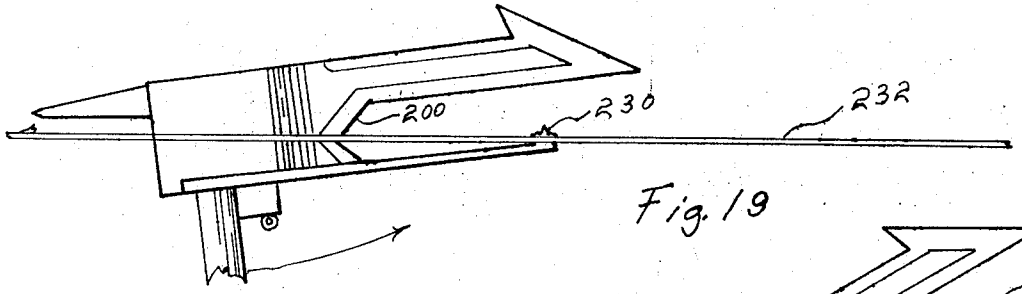


Fig. 19

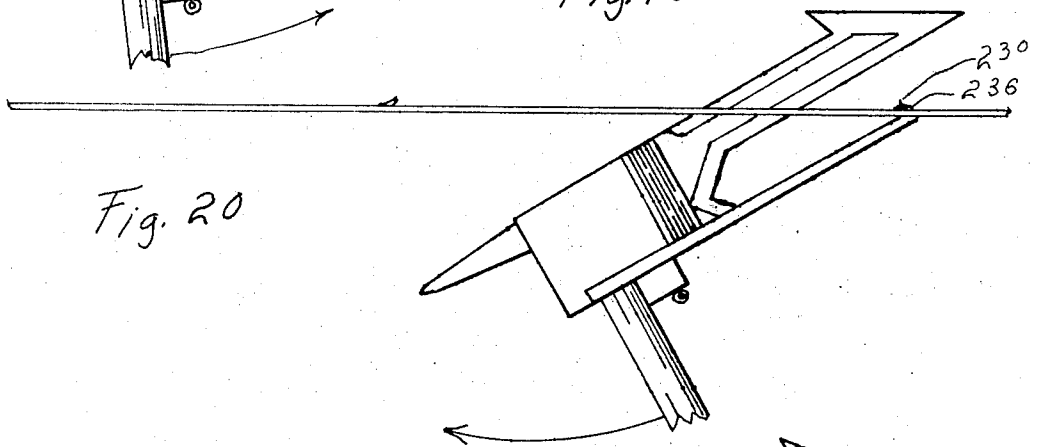


Fig. 20

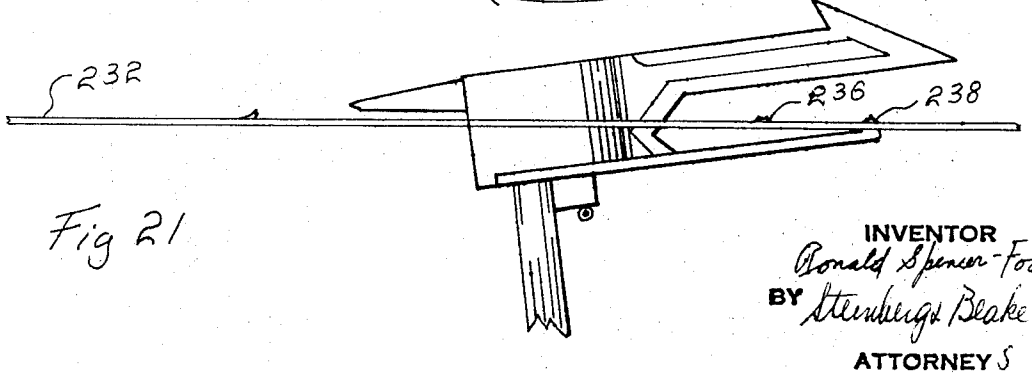


Fig 21

INVENTOR
Ronald Spencer-Foote
BY Steinberg & Blake
ATTORNEYS

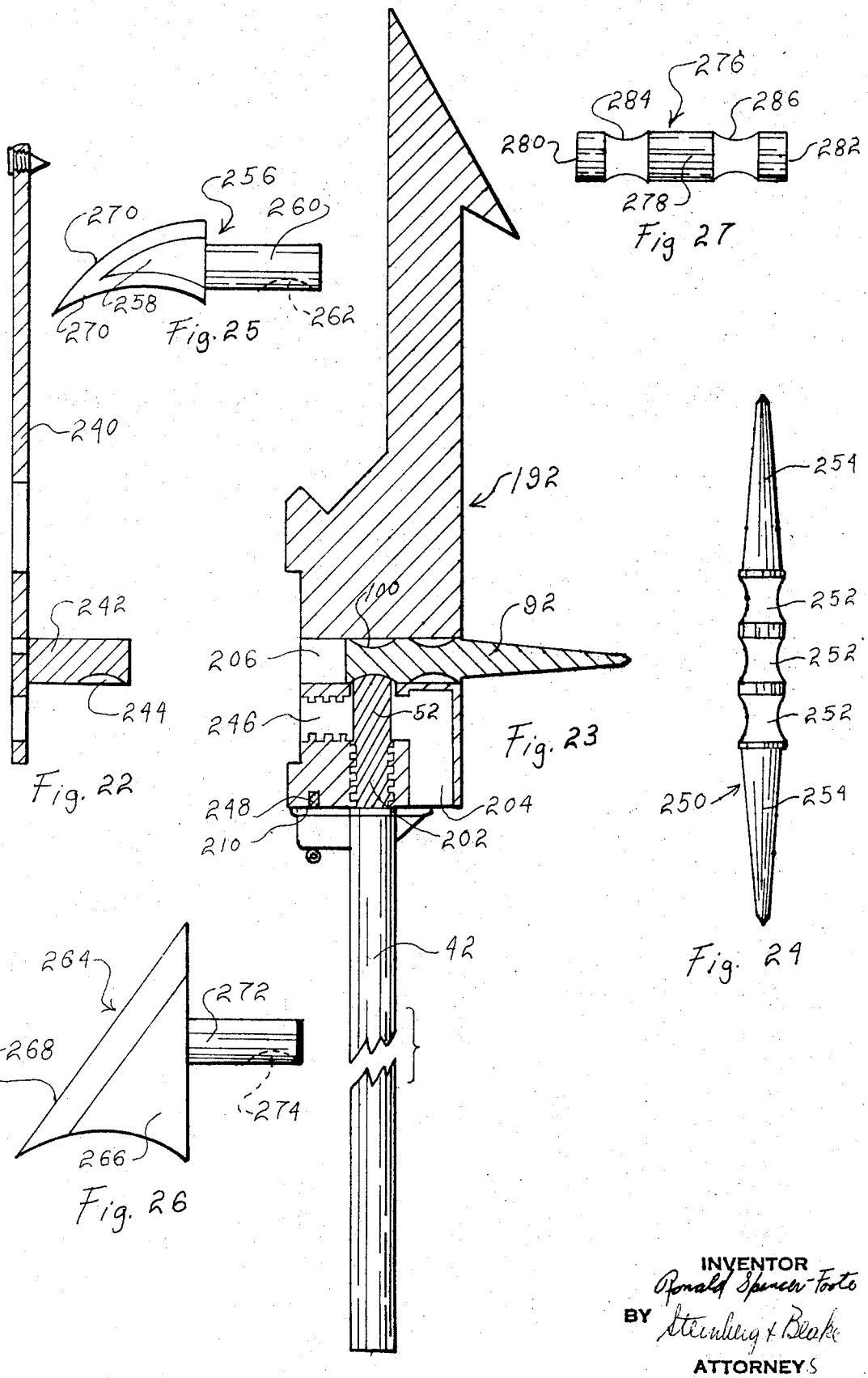


Fig. 27

Fig. 25

Fig. 22

Fig. 23

Fig. 24

Fig. 26

INVENTOR
Ronald Spencer Foster
BY Sterling & Blake
ATTORNEYS

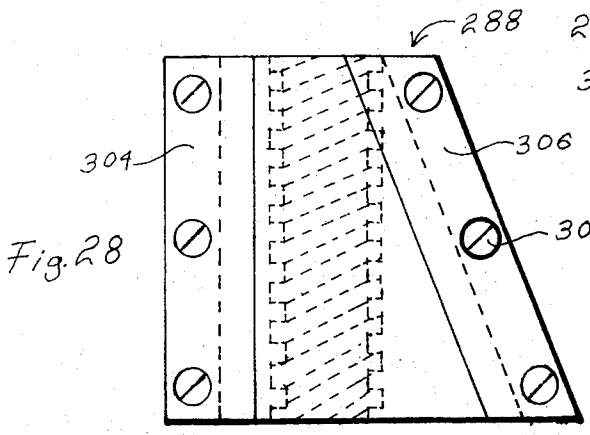


Fig. 28

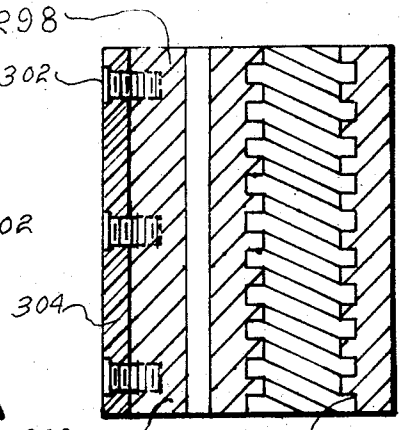


Fig. 30

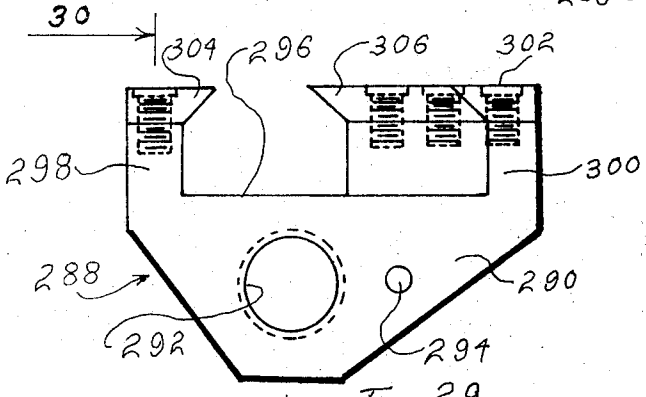


Fig 29

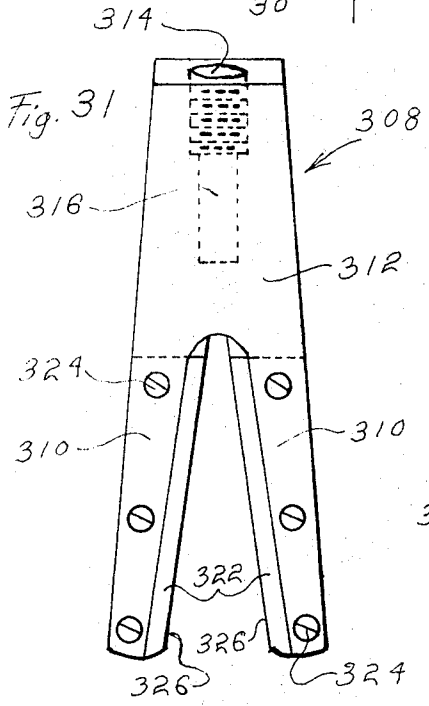


Fig. 31

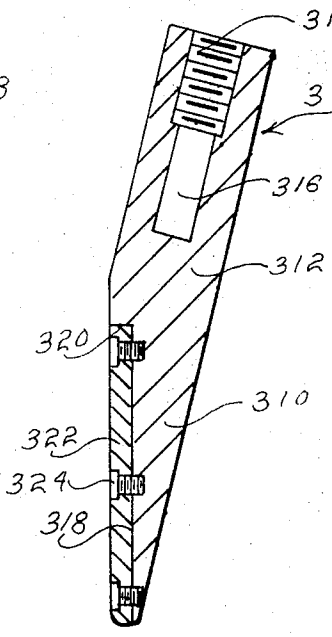


Fig. 32

INVENTOR
Ronald Spencer-Foote
BY Sterne, Kessler & Blake
ATTORNEYS

MULTIPURPOSE IMPLEMENT FOR PERFORMING DESTRUCTIVE OPERATIONS

BACKGROUND OF THE INVENTION

The present invention relates to a multipurpose implement wherein a plurality of tools can be selectively connected either separately or simultaneously to a handle assembly for carrying out various types of destructive functions.

The multipurpose tool of the invention can be used by firemen, building wreckers, construction workers, carpenters and the like.

Tools which are currently used in the fire service, as well as in other operations, have as a general rule specific functions with a separate tool being provided for a particular function. Thus, for example, a fireman equipped with a flat-head axe is provided only with this one implement and nothing more. If other tools are required to perform a specific function such as breaking a lock, tearing away plaster and the like, the fireman as compelled to leave the scene of action and go to a fire apparatus where various additional tools are situated so that the fireman can then equip himself with the proper tool for performing the desired task. During the course of the performance of his duties at a fire, a fireman may be called upon to use several different tools, thus necessitating several trips to the fire apparatus which may be located at some distance away from the scene of the fire. At the very least it may be necessary to find or locate another fireman at the scene who is equipped with the required tool. The result is that there is a loss of valuable time when time is of the essence in fighting a fire. There is also a hazardous situation when a fireman happens to be equipped with a plaster hook and is suddenly in need of a lock-breaker in order to force open a door and escape from a dangerous condition. If the door cannot be forced with the tool which happens to be at hand, namely the plaster hook, then the end result may well be the tragic loss of the fireman's life.

It is because of these conditions normally encountered in fighting-fighting operations that it has become standard practice for a team of firemen of a given company to equip themselves respectively with different tools so that among the several fireman who are simultaneously fighting a fire there will be on hand at least one of each of a plurality of different types of tools which may be required under conditions as set forth above. However, conditions are frequently encountered where several tools of the same type are urgently required, so that much time and energy are consumed wastefully by sending several firemen back to the apparatus in order to obtain the required tools.

Conventional tools of the above type, such as axes, plaster hooks, lock-breakers, and the like are necessarily relatively large and heavy, so that even when they are carried to the scene of a fire they detract from the mobility of the firemen.

SUMMARY OF THE INVENTION

It is accordingly a primary object of the present invention to provide a multipurpose implement which will avoid the above drawbacks.

In particular, it is an object of the present invention to provide a multipurpose implement which can be rapidly and conveniently manipulated so that it can perform a number of different functions such as the function of an axe, the function of lock-breaker, the function of a sheet-metal cutter, the function of a plaster hook, the function of an adze, or the function of a lock-puller.

In particular, it is an object of the present invention to provide one basic multipurpose implement with which a fireman can equip himself for the purpose of being able to carry out any of the above functions with the one basic implement without wasting time and energy travelling between the apparatus and the scene of the fire and without searching out at the scene of the fire another fireman who may have the required tool.

Furthermore, it is an object of the present invention to provide a multipurpose tool which while it can perform a large number of different functions nevertheless is capable of being conveniently carried about without providing any substantial detraction from the mobility of the fireman.

In particular, it is an object of the present invention to provide a multipurpose implement of the above type with which several firemen can be equipped so that it becomes possible for a number of firemen to concentrate the performance of identical operations with a high degree of intensity at a required location, so that the operations of a number of different firemen can augment eah other with great saving of time and with an increased safety and preservation of property.

According to the invention the multipurpose implement for carrying out destructive operations includes an elongated handle means for transmitting forces such as impact forces, wedging forces, pushing forces, pulling forces, twisting forces and the like. A plurality of tool means are provided for receiving these forces so as to carry out a number of different functions such as wood-cutting or wood-breaking operations, metal-cutting or metal-tearing operations, and lock-pulling or lock-breaking operations. A connecting means is provided on the one hand at part of the handle means and on the other hand at each of the several tool means for selectively connecting the tool means to the handle means with at least some of the tool means having different possible positions of connection with the handle means and with at least some of the tool means being capable of simultaneous connection to the handle means with these latter tool means extending in predetermined positions with respect to each other. Furthermore, the connecting means is capable of connecting at least some of the tool means to the handle means not only simultaneously but also in different selected positions one with respect to the other.

BRIEF DESCRIPTION OF DRAWINGS

The invention is illustrated by way of example in the accompanying drawings which form part of this application and in which:

FIG. 1 is a partly fragmentary sectional elevation of one embodiment of an implement according to the invention, the section of FIG. 1 being taken in a plane which contains the cutting edge of the illustrated axe-head as well as the axis of the handle means;

FIG. 2 shows in side elevation a pike which is combined with the axe-head;

FIG. 3 is a fragmentary sectional elevation similar to FIG. 1 but showing the pike of FIG. 2 displaced from the position of non-use of FIG. 1 into a position of use which is illustrated in FIG. 3;

FIG. 4 is an end view of the structure of FIG. 3 as seen from the left of FIG. 3;

FIG. 5 is a fragmentary elevation showing the axe-head of FIGS. 1 and 3 attached to the handle means in a position where the axe-head can perform the function of an adze;

FIG. 5A shows the components of FIG. 5 separately;

FIG. 6 is a sectional plan view taken along line 6—6 of FIG. 5 in the direction of the arrows;

FIG. 7 is a perspective illustration of the implement of FIGS. 5 and 6;

FIG. 8 illustrates how the implement of FIG. 7 is used to open a locked door which opens outwardly;

FIG. 9 illustrates how the implement of FIG. 7 is used to break open a locked door which opens inwardly;

FIG. 10 is a partly sectional elevation showing a modification of the implement of FIGS. 1–3 enabling the implement to form the function of a chisel;

FIG. 11 illustrates a cap which may be used to cover an exposed thread of the handle means of FIG. 10;

FIG. 12 shows partly in section an extension of the handle means which can be attached to a section of the handle means for providing an impact force as well as for determining the balance point of the implement;

FIG. 13 illustrates the operation of the handle means of FIG. 12 to provide an impact;

FIG. 14 illustrates in a partly sectional elevation another embodiment of the invention according to which the tool means is a sheet-metal cutter;

FIG. 15 is a side elevation of a gripping jaw forming part of the implement of FIG. 14;

FIG. 16 is a top plan view of the implement of FIG. 14;

FIGS. 17–21 illustrate different stages in the operation of the tool of FIGS. 14–16 with this tool augmented by an additional tool in the form of a pike as shown in FIG. 2;

FIG. 22 is a section elevation of another embodiment of a gripping jaw to be used with a tool such as that shown in FIG. 14;

FIG. 23 shows another operative connection between the sheet-metal cutter of FIG. 14 and the handle means with the pike also being included in the assembly, the structure of FIG. 23 being used as a plaster hook;

FIG. 24 shows another embodiment of a pike which may be used with an assembly as shown in FIG. 23;

FIGS. 25 and 26 respectively illustrate different forms of cutting blades which form tool means respectively capable of being connected with the sheet-metal cutter of FIG. 14 simultaneously with the handle means;

FIG. 27 illustrates a hammer poll also forming a tool means capable of being connected simultaneously to the handle means;

FIG. 28 is a front elevation of a lock-cylinder puller capable of being operatively connected with the handle means of the invention;

FIG. 29 is a bottom plan view of the puller of FIG. 28;

FIG. 30 is a section elevation of the puller of FIG. 28 and 29, taken along line 30—30 of FIG. 29 in the direction of the arrows;

FIG. 31 is an elevation of another embodiment of a lock-cylinder puller capable of being operatively connected with the handle means of the invention; and

FIG. 32 is a side elevation of the puller of FIG. 31 as seen from the right side of FIG. 31.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to FIGS. 1–4, the implement 40 illustrated therein includes an elongated handle means 42 for transmitting forces of many different types such as impact forces, wedging forces, pulling forces, pushing forces, twisting forces, and the like. This elongated handle means 42 in the illustrated example includes an elongated hollow tubular component 44 which may be made of any metal and which is of a circular cross section. Fixed to the upper end of the hollow tubular component 44 is an elongated rod component 46 which has an elongated lower portion 48 received in and fixed with the tubular component 44 in any suitable way. The elongated solid rod portion 46 is also of circular cross section and includes an intermediate externally threaded portion 50 and an elongated end portion 52 which forms a stud for various purposes.

A plurality of tool means are capable of being selectively connected with the elongated handle means 42 of the implement 40 so as to receive from the handle means 42 the forces transmitted thereby. In the example of FIGS. 1–4 the tool means which are selectively connected with the handle means 42 includes the axe-head 54. This axe-head 54 has a curved cutting edge 56 located in a predetermined plane which is normal to the flat surface 58 which defines a hammer surface at the end of the axe-head 54 opposed to its cutting edge 56. The axe-head 54 is formed with an axial bore 60 passing through the axe-head, and the axis of the bore 60 is located in a plane which contains the cutting edge 56 and which is normal to the hammer surface 58. At a part of its bore 60, the axe-head 54 is provided with internal threads 62 which coact with the external threads at the intermediate portion 50 of the rod 46 for interconnecting the handle means 42 and the tool means 54. Thus these threads form a connecting means for connecting the handle means 42 and the tool means 54 to each other in the position indicated in FIG. 1.

The axe-head 54 has a second bore 64 which extends through the axe-head 54 with the axis of the bore 64 being perpendicular to the axis of the bore 60 and the plane which contains both the axis of the bore 60 and the cutting edge 56. Thus, the axis of the bore 64 is parallel to the plane which contains the hammer surface 58. This bore 64 is internally threaded.

The axe-head 54 is additionally formed with a third bore 66 the axis of which is perpendicular to the surface 58 and in the plane which contains the axis of the bore 60 and the cutting edge 56. This bore 66 extends inwardly from the surface 58 across the bore 60, and it will be noted that the bore 64 also communicates with the bore 60, partly overlapping the latter. The bore 66 has just to the right of the bore 60, as viewed in FIGS. 1 and 3, a shoulder 68, and beyond the shoulder 68 the bore 66 has an elongated tapered portion 70.

At the side of the bore 60 opposite from the bore 64 the axe-head 54 is formed with a relatively short smaller bore 72 which extends parallel to the bore 64 inwardly from one side surface of the axe-head 54, the orientation of the bore 72 with respect to the axe-head being most clearly apparent from FIG. 5. In addition the axe-head 54 is formed with a bore 74 which extends into the axe-head, parallel to the bore 60, from the

lower surface of the axe-head, as viewed in FIGS. 1 and 3, to the extent illustrated in the latter figures.

In order to perform a normal ax function, the handle means 42 is connected with the tool means 54 in the manner illustrated in FIGS. 1 and 3. A means is provided to prevent rotary movement of the handle means 42 and the tool means selected to be connected thereto, one with respect to the other, this means for preventing relative rotary movement between the tool means and handle means interconnected by the connecting means formed by the threads in the example of FIGS. 1 and 3 taking the form of an assembly 76 which includes a block 78 fixed to the rod 46 in the manner shown in FIGS. 1 and 3. In addition to the block 78, the assembly 76 includes a plate 80 which is also fixed to the rod 46. The block 78 is formed with a stepped bore 82 receiving an elongated plunger 84 which has a free end extending through a bore in the plate 80 so that this free end of the plunger 84 can be received in the bore 74, in the position of the parts indicated in FIGS. 1 and 3. Within the bore 82 a spring 86 surrounds the plunger 84, pressing at one end against a flange or collar 88 surrounding the plunger 84 and freely movable within the bore 82 and pressing at its other end against the wall portion of the block 78 which surrounds the plunger 84 at its end distant from the bore 74. This latter end of the plunger 84 is formed with an eye 90.

By way of the eye 90 it is possible for the operator to hold the plunger 84 in a retracted position, in opposition to the force of the spring 86, with the free end of the plunger situated inwardly of the plate 80, and with the parts in this position it is possible to thread or unthread the handle means 42 and the selected tool means 54 with respect to each other for connecting or interconnecting the handle means and the tool means. If desired a suitable string, for example, can be attached to the eye 90 so that pulling on this string and holding it with one hand against the handle means 42 will enable the plunger to be conveniently retracted. Once the parts have the position shown in FIG. 1, the plunger can be released so that the spring 86 will advance the free end of the plunger into the bore 74, and in this way the assembly 76 forms a means for preventing relative rotary movement between the handle means 42 and the selected tool means which in the illustrated example is the axe-head 54.

A second tool means which can be selectively connected to the assembly of FIGS. 1 and 3 is the pike 92 illustrated in FIG. 2. This pike 92 has an elongated tapered portion 94 terminating in a pointed end 96. Beyond the tapered portion 94 the pike 92 has a pair of circumferentially extending annular grooves 98 and 100 arranged as illustrated in FIG. 2. The curvature of the grooves 98 and 100 corresponds to the curvature at the free end of the stud 52 of the rod 46 of the handle means 42. Opposite to its pointed end 96 the pike 92 has a flat end face 102 which is situated in a plane perpendicular to the axis of the pike 92. The tapered bore portion 70 has a configuration matching that of the tapered pike portion 94.

The pike 92 may have a position of non-use illustrated in FIG. 1. In this position the pike 92 is housed within the axe-head 54 in the manner illustrated in FIG. 1. A shoulder 104 at the largest end of the tapered pike portion 94 engages the shoulder 68 of the axe-head 54, and when the handle means 42 is connected by the connecting means 50, 62 to the tool means 54, the curved free end of the stud portion 52 is received within the annular groove 98 of the tool means 92, so that in this way this tool means 92 is fixed in its position of non-use within the tool means 54 when the parts have the position shown in FIG. 1. In this position the end surface 102 is flush with and forms a continuation of the hammer surface 58 of the axe-head. Thus, with the parts assembled as shown in FIG. 1 the implement 40 forms a flathead axe.

In order to convert the implement from the flathead axe of FIG. 1 into a pike-head axe, as shown in FIG. 3, it is only necessary to retract the plunger 84 and unthread the axe-head 54 and handle means 42 with respect to each other through a distance sufficient to release the pike 92 so that it can be removed out of the axe-head from its position of non-use illustrated in FIG. 1. The pike is then reversed and introduced into the bore 60 until the end surface 102 of the pike engages the shoulder 68, as shown in FIG. 3. Now the connecting means 50, 62 is actuated to again interconnect the components so that they will have the position shown in FIG. 3. At this time the free end of the stud 52 will enter into the groove 100 so as to maintain the parts fixed in the position of FIG. 3 with the pike 92 extending perpendicularly from and outwardly beyond the hammerhead surface 58 of the tool 54. Thus, FIGS. 3 and 4 show the components of FIG. 1 assembled in a different position with respect to each other according to which the pair of tool means 54 and 92 have, instead of the position shown in FIG. 1, the position illustrated in FIGS. 3 and 4 enabling the assembly to form a pike-head axe.

It is also possible to interconnect the pair of tool means 54 and 92 with the handle means 42 in a third position, as illustrated in FIGS. 5 and 6. In this case the externally threaded portion 50 of the connecting means coacts with the internally threaded bore 64 of the connecting means so that the elongated handle means 42 extends prependicularly with respect to the plane which contains the cutting edge 56 and the axis of the bore 60. It will be noted that when the parts are assembled in this position, the means formed by the assembly 76 will have its plunger 84 situated in the bore 72 to prevent relative rotary movement between the tool means 54 and the handle means 42. When the parts are assembled in the position of FIGS. 5 and 6, the elongated stud 52 at the free end of the handle means 42 projects outwardly beyond the axe-head 54 perpendicularly to a side surface thereof as is apparent from FIG. 5.

As may be seen from FIG. 6, the tool means formed by the pike 92 is, in this position of the components, inserted into the bore 60 so that the flat surface 102 reaches up to the inner end of the threads 62 of the connecting means. The threaded intermediate portion 50 of the connecting means will in the position of the parts shown in FIG. 6 be received in the outer groove 110 which forms the part of the connecting means connected to the pike 92 so as to maintain the pike 92 assembled with the axe-head 54 in the manner illustrated in FIG. 6.

With the parts assembled as shown in FIGS. 5 and 6, the implement 40 will have the configuration shown in perspective in FIG. 7. Thus, with the parts positioned as shown in FIGS. 5–7 the implement 40 will form an adze having a pike 92 projecting from one edge thereof

and having the stud **52** projecting from one side surface of the axe-head **54.**

This implement **40** has important functions in connection with firefighting operations, as illustrated in FIGS. **8** and **9.**

Thus, referring to FIG. **8,** the use of the implement of FIG. **7** is shown in connection with breaking open a door **110** which opens outwardly and which is initially locked by a conventional lock assembly **112.** Thus, in order to be opened the door **110** must swing in a counterclockwise direction, as viewed in FIG. **8,** about the hinges **114** which connect the door to the frame **116.** The axe-head **54** is driven into the crack between the door **110** and the right side of the frame **116,** as viewed in FIG. **8,** this operation being carried out by applying impact forces from another tool such as another axe against the surface **58** in the direction indicated by the arrow **118.** The adze tool formed by the implement **40** is driven into the position shown in FIG. **8** just above or beneath the lock **112.** With the parts in the position of FIG. **8,** the handle means **42** is pulled in the direction indicated by the arrow **120,** and the stud **52** acts as a fulcrum against the outer surface of the right wall of the frame **116.** This pulling in the handle means **42** will result in tearing the bolt of the lock **112** out of its recess in the right doorframe component **116** shown in FIG. **8,** and thus the door **110** will be forcibly opened in the outward direction. Thus, with the implement **40** of FIGS. **5–7** the stud **52** forms a fulcrum enabling the implement to act effectively in the opening of a door **100** such as that shown in FIG. **8.**

Referring to FIG. **9,** there is shown therein a door **122** which opens inwardly in the direction of the arrow **124.** In this case suitable impact forces applied in the direction of the arrow **126** against the surface **58** of the axe-head **54** will drive this axe-head of the implement **40** into the right doorframe component shown in FIG. **9.** This adze-tool type of implement is driven into the position shown in FIG. **9** where the free end of the stud **52** becomes situated directly next to the cylinder of the lock assembly **112** which may be identical with that of FIG. **8.** With the parts in the position shown in FIG. **9** the operator will pull on the handle means **42** in the direction of the arrow **128,** so that with the cutting edge region of the adze-type of tool **54** acting as a fulcrum the stud **52** will cause the cylinder of the lock assembly **112** to be pressed through and out of the door **122** tearing the lock bolt from its recess in the door jamb, so that the door **122** will be forcibly opened in the direction of the arrow **124.**

FIGS. **10–13** illustrate an embodiment of the invention where structure as described above with slight further modifications can perform additional functions. Thus, the implement **130** shown in FIG. **10** has an elongated handle means **132** identical with the handle means **42** except that the outer free end of the handle means **132** has a threaded portion **134.** Thus, the handle means **132** includes the assembly **76** which forms the means for preventing relative rotation between the interconnected components, as well as the threaded portion **136** and the stud **138** corresponding in all respects to the threaded portion **50** and the stud **52** refered to above. The tool means **140** corresponds to the tool means **54** except that the tool means **140** is provided with a notch **142** and an additional internally threaded bore **144** extending inwardly from the flat hammer surface **146** which corresponds to the surface **58.** This internally threaded bore **144** is parallel to the bore **148** which corresponds in all respects to the bore **66.** The tool means **140** is additionally provided with the bores **150** and **152** respectively corresponding to the bores **60** and **64,** and the pike **92** is shown seated in its position of non-use in FIG. **10** in the bore **148.** This assembly as thus far described can perform all of the functions described above in precisely the same way with the tool means **140** and **92** assembled with the handle means **132** in exactly the manner described above.

However, because of the presence of the additional internally threaded bore **144,** it is possible for the handle means **132** to be assembled with the tool means **140** in the position shown in FIG. **10,** and the surface **146** is formed with an additional bore **154** for receiving the free end of the plunger of the means **76** so that the parts will be retained in the position shown in FIG. **10.** In this position the tool means **140** can perform the function of a chisel and the notch **142** is available to enable the implement **130** to function also as a spanner for shutting off valve cocks of the type commonly used on gas meters, so as to control gas flow in this way.

FIG. **11** shows an internally threaded cap **156** which can be threaded onto the threads **134** so as to cover and protect the latter when they are not used, this cap **156** thus covering the free end of the elongated handle means **132.**

Instead of the handle means **132** of FIG. **10,** it is possible to connect to the tool means **140** the handle means **158** of FIG. **12.** This handle means **158** of FIG. **12** is identical with the handle means **132** except that the free end of the handle means **158** is formed with an internally threaded portion **160** beneath which the handle means **158** has an externally threaded portion **162.** In addition, the handle means **158** fixedly carries just above the means **76** an externally threaded sleeve **164.** Spaced equidistantly between the externally threaded portions **162** and **164** are a pair of anvil collars **166** and **168** which are rigidly fixed with the elongated handle means **158** and may be formed integrally therewith if desired.

Between the anvil collars **166** and **168,** on the one hand, and the externally threaded portions **162** and **164,** on the other hand, there are respectively situated a pair of freely movable sleeves **170** and **172** which freely surround the elongated handle means **158.** The sleeve **170** has an internally threaded portion **174** capable of being threaded with the externally threaded portion **162,** while the sleeve **172** has an internally threaded portion **176** capable of being threaded onto the externally threaded portion **164,** as illustrated in FIG. **12.** These sleeves **170** and **172** are formed at their ends which are directed toward the anvil collars **166** and **168** with recesses **178** and **180** capable of receiving the collars **166** and **168,** the collar **166** being shown situated within the recess **178** of the sleeve **170.**

Between the collars **166** and **168** an elongated impact means **182** is situated. This impact means **182** is in the form of a heavy metal sleeve which can move freely along the handle means **158** between the anvil collars **166** and **168.** Where these collars are integral with the handle the impact means **182** can be formed in two halves having adjoining surfaces situated in planes which contain the axis of the handle means **158** and these two halves can be fixed to each other in any suitable way. Where the collars **166** and **168** are fixed to

but not integral with the handle means **158** the impact means **182** can take the form of one-piece sleeve. At its ends the impact means **182** is formed with a pair of internally threaded recesses **184** and **186** capable of being threaded onto externally threaded end portions of the sleeves **170** and **172.** In the position of the parts shown in FIG. **12** the impact means **182** is threaded to the sleeve **170** so as to be fixed in this way to the collar **166.** At this time the sleeve **172** is connected to the threads **164.** However it is possible to reverse the assembly by disconnecting the impact means **182** and sleeve **170** from each other. At this time the sleeve **170** can be connected to the threads **162** and the sleeve **182** can be fixed to the external threads of the sleeve **172** with the collar **168** received in the recess **180.** With this impact means **182** fixed to the handle means **158** in either of these positions it is possible for this handle means **158** to be combined in any one of a number of different selected operative positions with the tool means **140** as described above and as shown in FIGS. **1, 3, 7,** and **10.** By selectively connecting impact means **182** either to the collar **166** or to the collar **168** it is possible to shift the balance point of the entire implement to a desired location to enable the implement to be used most effectively.

When, however, it is desired to use the impact means **182** to provide impact forces rather than to determine the blance point, both of the sleeves **170** and **172** are connected to the threaded portions **162** and **164,** as illustrated in FIG. **13,** so that both of the collars **166** and **168** are exposed and situated inwadly beyond the sleeves **170** and **172.** With the parts in the position shown in FIG. **13** it is possible for the operator to propel the impact means **182** downwardly, for example, so as to strike forcefully against the anvil collar **168,** and it is also possible for the operator to propel the impact means **182** forcefully in an upward direction so as to strike against the upper anvil collar **166,** and in this way impact forces can be provided in one direction or the other along the axis of the elongated handle means **158** with the latter being capable of connection to the tool means referred to above in all of the manners described above.

In addition, it is possible to invert the handle means **158** from the position shown in FIGS. **12** and **13,** with the cap **156** removed from the threads **134,** so that the internally threaded portion **160** can be threaded onto the portion **134.** In this way the handle means **158** can form an extension of the handle means **132,** enabling the entire implement to have a much longer handle which may be more convenient for certain purposes, with the added possibility of providing either a selected location of the balance point or impact forces in the manner described above.

FIGS. **14–16** illustrate an embodiment of the invention where the implement **190** forms a sheet metal cutter. This implement **190** has in the illustrated example a handle means **42** identical with that shown in FIGS. **1, 3,** and **4.** However, if desired the handle means **130** of FIG. **10** or the handle means **158** of FIG. **12,** either by itself or in combination with the handle means **130,** may be used with the implement **190** instead of the handle means **42.**

This implement **190** includes a tool means **192** which includes an elongated relatively thin blade portion **194** having the pointed regions **196** and **198** and formed with a cutting edge **200** extending all along the periphery of the blade portion **194** the tool means **192.** To the right of the blade portion **194** the tool means **192** is thicker and is formed with the several bores **202, 204,** and **206.** The bore **206** extends completely through the rear portion **208** which forms that part of the connecting means which is fixed with the tool means **192.** The threaded portion **50** of the handle means **42** forms the other part of the connecting means, and this embodiment also has a means **76** for preventing relatve rotation between the interconnected components. The axes of the bores **202, 204,** and **206** are all situated in a plane which contains the cutting edge **200,** and the bores **204** and **202** are parallel to each other, extending perpendicularly to a flat end face **210** situated at the right of the tool means **192,** as viewed in FIG. **14,** and capable of being used as a hammer surface, if desired. The bore **206** has an axis which is parallel to the plane which contains the surface **210.**

At its lower region the blade **194** has an elongated projection **212** capable of being received in a slot **214** which is formed in a gripping jaw element **216** in the form of a relatively wide plate which is perpendicular to the blade **194** and which has the configuration most clearly shown in FIG. **16.** This gripping jaw **216** has a rear edge **218** engaging a shoulder **220** formed at the lower surface of the rear portion **208** of the tool means **192,** so that when the part **212** of the blade **194** is in the slot **214** the edge **218** coacts with the shoulder **220** in order to prevent relative rotation between the gripping jaw **216** and the blade **194.** In addition it will be noted that adjacent to its edge **218** the gripping jaw plate **216** is formed with an opening **222** through which the handle means **42** projects. As further security in the connection, the gripping jaw **216** fixedly carries a pin **224** formed with an annular recess **226** and received in the bore **206** in the position of the parts shown in FIG. **14,** the gripping jaw being formed just below the pin **224** with a bore **228** which receives the free end of the plunger **84** of the means **76.**

At its wider left end, as viewed in FIGS. **14–16,** the gripping jaw **216** is formed with a row of threaded bores into which individual pointed gripping teeth **230** are threaded so that the pointed end thereof extend upwardly toward the free end of the blade **194.**

With parts assembled as shown in FIGS. **14–16,** it is possible to use the implement **190** as a sheet metal cutter in the manner illustrated in FIGS. **17–21.** This operation is extremely important for firefighting operations where in many old buildings there are sheet metal ceilings which must be cut through during firefighting operations.

It is to be noted that the pike **92** shown in FIG. **2** has been introduced into the bore **204** with the stud **52** extending into the recess **100** of the pike **92** so as to fix the latter to the tool means **192** in order to provide the implement as shown in FIGS. **17–21.** In these figures the implement is shown as capable of cutting through sheet metal not only of ceilings but also of air-conditioning ducts or grease ducts, as is commonly encountered in various installations such as restaurants or the like, and in addition such a tool is of great utility in cutting through the metal skin of aircraft, automobiles, or the like.

Referring to FIG. **17,** the pointed sharpened end **196** of the tool means **192** has been forcibily driven through the wall of sheet metal **232** as by applying suitable impact forces against the surface **210** with any other suit-

able tool which is available. The gripping jaw **216** remains beneath the wall **232** so that the teeth **230** thereof can engage the wall **232** from beneath. FIG. **18** shows the tool means **192** driven further through the wall **232** as by applying further impact forces against the surface **210**, for example, and the spiked teeth **230** of the gripping jaw **216** are now in a position to puncture through the wall **232**, to grip the latter with the tool while the rear region **208** and the pike **92** have been forcefully pushed up through the wall **232**. At this time the crest **234** of the lower V-shaped portion of the cutting edge **200** forms a fulcrum against an end of the opening in the wall **232** formed by penetration of the implement to the position shown in FIG. **18**, and with this crest **234** acting as a fulcrum the operator swings the handle means **42** in a counterclockwsie direction, as illustrated in FIG. **19**, so that the spiked teeth **230** will now penetrate through the wall **232** and will themselves form a second fulcrum about which the implement continues to turn while the part of the cutting edge **200** above the crest **234** now cuts through the sheet metal as the operator continues to turn the handle means **42** together with the remainder of the implement to the position illustrated in FIG. **20**. Then the handle means **42** will be swung in a clockwise direction to release the teeth **230** from the openings **236** which were initially formed in the sheet metal **232**, and the entire implement is advanced to the right, as viewed in FIGS. **20** and **21**, up to the position of FIG. **21** where the above actions are repeated so that the spiked teeth **230** puncture through to form the openings **238**, and in this way the implement will progress along the sheet metal **232** in order to cut through the latter.

Referring to FIG. **22**, the gripping jaw **240** illustrated therein is identical with the gripping jaw **216** described above except that the pin **242** is formed only with a circular indentation or recess **244** instead of the annular recess **226** which is provided in the pin **224**. This modified gripping jaw **240** can be used in precisely the same way as the jaw **216**.

FIG. **23** illustrates how it is possible to interconnect the components of FIG. **14** so that they can function as a plaster hook. In this case the handle means **42** has been removed from the threaded bore **246** and instead has been introduced into the bore **202**. The free end of the plunger **84** is now received in a bore **248** which is provided for this purpose at the surface **210**. With the tool means **192** thus assembled with the handle means **42**, as shown in FIG. **23**, the implement can be used for pulling down lathe and plaster or plaster board, or it may be used for pulling down sheet metal ceilings in buildings, so as to reveal fire which otherwise might remain concealed. In the particular implement combination which is shown in FIG. **23**, the pike **92** has been assembled with the tool means **192** by being introduced into the bore **206** so that the stud **52** will extend into the recess **100** for locking the pike **92** in the position illustrated in FIG. **23**.

Instead of the pike **92**, it is possible to assemble either the gripping jaw **240** or the gripping jaw **216** with the tool means **192**, the pin **224** or **242** now extending into the bore **206** through the left end thereof, as viewed in FIG. **23**, so that the stud **52** can engage either the recess **226** of the pin **224** or the recess **244** of the pin **242** for fixing the gripping jaw in position. This construction can be used for cutting through sheet metal situated at an attitude which renders the arrangement of FIG. **23** more convenient than that illustrated in FIGS. **14–16**.

As may be seen from FIG. **24**, it is also possible to use with the assembly of FIG. **23** a double-ended pike **250**. This tool means **250** has at its intermediate portion three intermediate recesses **252** beyond which are located a pair of elongated tapered pike portions **254**. Thus, the tool means **250** can be inserted into the bore **206**, for example, extending completely through and beyond opposite ends of the bore with the stud **52** engaging the central recess **252** in order to fix the tool means **250** in a position where a pair of elongated pike portions **254** will extend beyond the opposed faces of the tool means **192**.

Also it is possible to introduce into the bore **206**, through either end thereof, a tool means **256** shown in FIG. **25**. This tool means has a cutting blade portion **258** of the configuration illustrated in FIG. **25**, and this blade portion is integral with an elongated pin **260** formed with a recess **262** for receiving the free end of the stud **52** so that in this way the tool means **256** can be fixed with the tool means **192** extending from either end of the bore **206**.

Instead of the tool means **256** it is possible to selectively interconnect with the tool means **192** a tool means **264** as indicated in FIG. **26**, this tool means having the triangular blade **266** formed with the straight cutting edge **268** while the blade **258** of FIG. **25** has the curved cutting edge **270**. The pin **272** is integrally fixed with the blade **266** and is formed with a recess **274** which will receive the free end of the stud **52** with the tool means **264** extending from either end of the bore **206**.

It is furthermore to be noted that with the handle means **42** oriented with respect to the tool means **192** as shown in FIG. **14**, it is possible to introduce either the tool means **256** or the tool means **264** into the bore **204** so that the blade **258** or the blade **256** will project from the surface **210**.

Referring to FIG. **27**, there is shown therein a tool means **276** in the form of a hammer poll. This tool means is in the form of an elongated body **278** formed inwardly of its opposed ends **280** and **282** with a pair of annular recesses **284** and **286**. With the handle means **42** having the position with respect to the tool means **192** shown in FIG. **23** it is possible to introduce the hammer poll **276** into the opening **206** to project from either end thereof while the stud **52** engages one or the other of the recesses **284** or **286** so as to fix the hammer poll in an operative position projecting from the tool means **192** either to the right or to the left, as viewed in FIG. **23**. Also it is possible to assemble the tool means **276** with the axe-head **54**. In this case the tool means **276** will be introduced either into the bore **66** or into the bore **60**, with either end of the hammer poll projecting beyond the axe-head **54** and with the stud **52** also engaging one or the other of the recesses **284** and **286** in order to maintain the parts assembled.

FIGS. **28–30** illustrate an embodiment of a tool means **288** which forms a cylinder lock puller. This tool means **288** includes a block **290** formed of any suitable metal and also formed with a threaded bore **292** passing therethrough to form part of the connecting means by which the tool means **288** can be connected with any of the handle means referred to above. The block

290 is formed also with a recess 294 which receives the free end of the plunger of the means 76.

The block 290 is formed along one surface with a recess 296 defined between a pair of legs 298 and 300. The leg 298 is parallel to the axis of the bore 292 while the leg 300 is inclined with respect to this axis so that the recess 296 has a wedge-shaped configuration. By way of suitable countersunk screws 302 a pair of blades 304 and 306 are fixed to the block 290 with these blades having inner edges extending over part of the space formed by the recess 296. As a result of the relative inclination of the blades 304 and 306, most clearly shown in FIG. 28, these blades form between themselves a tapered wedge-shaped space enabling the inner edges of the blades to grip behind the exterior cylindrical part of a cylinder lock enabling the puller of FIGS. 28–30 to securely grip the cylinder and pull it away from the door in order to displace the bolt of the lock out of the recess, and thus the tool means 288 can be assembled with any of the handle means described above in order to form an effective lock puller to give access through locked doors into rooms for firefighting purposes.

According to the embodiment of the invention which is illustrated in FIGS. 31 and 32, there is also a tool means 308 which forms a cylinder lock puller, but in this case the tool means is provided with a pair of symmetrical legs 310. These legs 310 form part of a block 312 of any suitable metal formed at its upper end, as viewed in FIGS. 31 and 32, with an internally threaded bore 314 capable of receiving any of the handle means referred to above. Thus, the bore 314 has below its threaded portion an elongated unthreaded portion 316 to receive the stud 52, for example.

The legs 310 are formed with flat surfaces 318 and shoulders 320. Against these flat surfaces and shoulders of the legs 310 are located a pair of blades 322 fixed in position by the countersunk screws 324 received in suitable bores formed in the legs 310. The blades 322 are provided with edges 326 which extend over the space between the legs 310, and it will be noted that with this arrangement these legs are equally inclined in opposite directions with respect to the axis of the bore 314, so that the edges 326 of the hardened plates 322 form opposite sides of a V-shaped recess and extends symmetrically with respect to this recess. With this embodiment also it is possible to insert the edges 326 behind the exterior circular flange of a cylinder of a lock so as to engage the cylinder and pull it out of the door to displace the bolt from the recess and thus give access through a door which initially is locked.

It is apparent from the above description that with the multipurpose implement of the invention it is possible to equip firemen with basic tools so as to enhance the performance of the firemen by providing interchangeability of the component parts of the basic tools, thereby increasing and implementing each individual fireman's ability to perform the functions within the scope of the basic tools. If for example a fireman equipped with a tool set up as a sheet metal cutter is suddenly in need of a plaster hook, this is easily obtained by changing the assembly of components from that shown in FIG. 14 to that shown in FIG. 23. With the arrangement of handle means as illustrated in FIGS. 10–13 it is possible to increase the length of the handle means. For example one fireman may receive a handle means 158 from another fireman so as to provide an extension of the handle means 132. In this way a longer reach can be provided for an implement. It is to be noted that when the handle means of FIGS. 10 and 12 is used with a plaster hook, for example, the impact means of FIG. 12 becomes readily available to drive the tool means through plaster, lathe, or the like. Also, in connection with the cylinder lock pullers referred to above it is possible to use either a handle means as shown in FIG. 1 or the handle means of FIG. 12 or FIGS. 10 and 12 in order to achieve impact forces to drive the edges of the cylinder lock pullers behind the cylinders of the locks, and in order to achieve greater leverage by having a longer handle.

Thus, with the invention there are a few basic tool heads, a few basic forms of handles, and additional component parts such as hooks, pikes, hammer polls, and the like, all of which can be releasably connected to each other in various types of combinations. With this arrangement it is possible to convert the tools so that they will form a flathead axe, a pike-head axe, an adze, a lcok breaker, a shovel, a hoe, a chisel, a scraper, an over-hauling tool, a plaster hook, a sheet metal cutter, a sheet metal hook, a lock puller, a fork tool, a hammer, a gas shut-off tool, as well as others. The ease of conversion from one implement to another and the rapidity of connection and positive locking of the components with the various possible combinations inherent in the multipurpose implement of the invention create the possibility of expediting the extinguishing of fires and the safeguarding of life.

What is claimed is:

1. A multipurpse tool comprising an axe-head, a pike, and a handle, said axe-head being formed with a bore in which said pike is stored in a position of nonuse where said pike does not extend beyond the exterior surface of said axe-head, and said handle being removably connected to said axe-head and releasably locking said pike in said bore of said axe-head in the stored position of nonuse of said pike.

2. The combination of claim 1 and wherein said pike has an operative position reversed from its position of non-use and extending only partly into said bore of said axe-head, and said handle also fixing said pike to said axe-head in said operative position of said pike.

3. A multipurpose implement for carrying out destructive operations comprising elongated handle means for transmitting forces, a plurality of tool means for receiving said forces from said haandle means and for applying said forces to a location where th destructive operation is to be carried out, said plurality of tool means including an axe-head and connecting means operatively connected on the one hand with said handle means and on the other hand with said axe-head for connecting said axe-head to said handle means to be operated thereby, said axe-head having at one end an elongated cutting edge located in a predetermined first plane and at an opposite end a flat hammer surface located in a predetermined second plane perpendicular to said first plane, said axe-head being formed with a pair of mutually perpendicular bores provided with internal threads forming part of said connecting means, one of said bores having an axis located in the plane of said cutting edge and the other of said bores having an axis perpendicular to the plane of said cutting edge and parallel to the plane of said hammer surface, said elongated handle means having at an end region a threaded portion forming part of said connecting means and

when located in said bore whose axis is in the plane of said cutting edge providing a normal axe function for said axe-head and when located in said bore whose axis is perpendicular to the plane of said cutting edge providing for said axe-head an adze function, said axe-head being formed with a third bore whose axis is in the plane of said cutting edge, said third bore extending perpendicularly from said flat hammer surface, and said plurality of tool means including a pike stored in said third bore in a position of non-use, said bore whose axis is also in said plane of said cutting edge communicating with said third bore and said handle means when in said first-named bore whose axis is in the plane of said cutting edge coacting with said pike for locking the latter in its stored position of non-use in said third bore.

4. The combination of claim **3** and wherein said pike has a position of use reversed from its position of non-use and located partly in said third bore while projecting freely beyond said flat hammer surface perpendicularly thereto, and said handle means also coacting with said pike when the latter is in said position of use projecting from said hammer surface for locking said pike to said axe-head.

5. The combination of claim **4** and wherein said pike has a pointed operating end and an opposite end formed with a recess for receiving a portion of said handle means when the latter locks said pike either in its position of use or in its position of non-use.

6. The combination of claim **5** and wherein said first-named bore whose axis is in said plane of said cutting edge extends completely through said axe-head for receiving said pike in a second position of use projecting from said axe-head in a position spaced from but parallel to said flat hammer surface, said bore whose axis is perpendicular to the plane of said cutting edge communicating with said first-named bore and engaging said pike when the latter is its second position of use for locking said pike in its second position of use while said handle means extends perpendicularly with respect to the plane of said cutting edge of said axe-head so that the latter may function as an adze when said pike is in said second position of use thereof.

7. A multipurpose implement for carrying out destructive operations comprising elongated handle means for transmitting forces, tool means for receiving said forces from said handle means and for applying said forces to a location where the destructive operation is to be carried out, said tool means including an axe-head, and connecting means operatively connected on the one hand with said handle means and on the other hand with said axe-head for connecting said axe-head to said handle means to be operated thereby, said axe-head having at one end an elongated cutting edge located in a predetermined first plane and at an opposite end a flat hammer surface located in a predetermined second plane perpendicular to said first plane, said axe-head being formed with a pair of mutually perpendicular bores provided with internal threads forming part of said connecting means, one of said bores having an axis located in the plane of said cutting edge and the other of said bores having an axis perpendicular to the plane of said cutting edge and parallel to the plane of said hammer surface, said elongated handle means having at an end region a threaded portion forming part of said connecting means and when located in said bore whose axis is in the plane of said cutting edge providing a normal axe function for said axe-head and when located in said bore whose axis is perpendicular to the plane of said cutting edge providing for said axe-head an adze function, said axe-head having a third bore formed with internal threads forming part of said connecting means, said third bore extending perpendicularly from said flat hammer surface and also having an axis in the plane of said cutting edge, said handle means when connected to said axe-head in said third bore thereof projecting perpendicularly from said hammer surface to provide a chisel function for said axe-head.

* * * * *