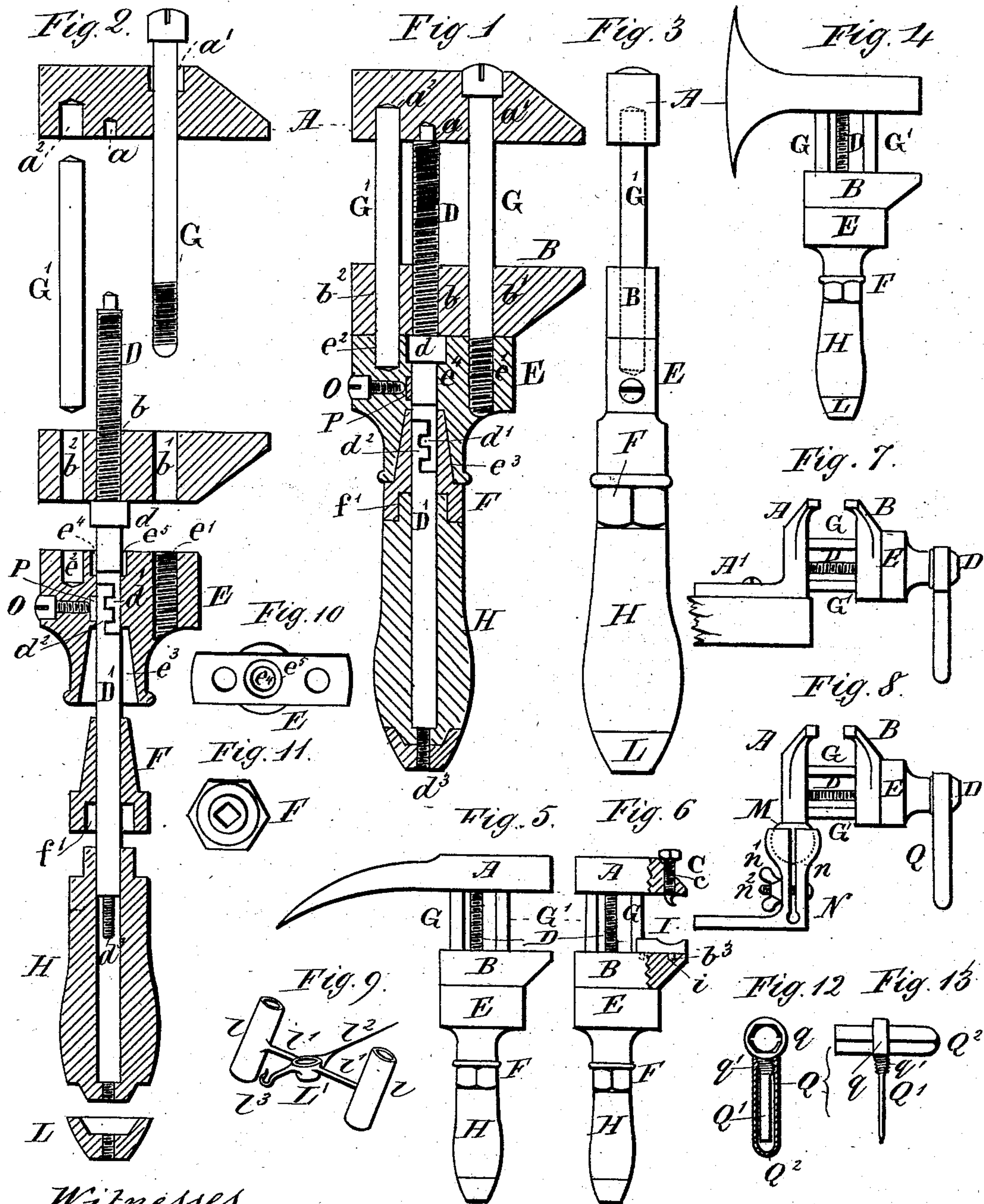


(No Model.)

H. PORT.  
CONVERTIBLE TOOL.

No. 290,106.

Patented Dec. 11, 1883.



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# UNITED STATES PATENT OFFICE.

HENRY PORT, OF VINCENNES, FRANCE.

## CONVERTIBLE TOOL.

SPECIFICATION forming part of Letters Patent No. 290,106, dated December 11, 1883.

Application filed September 17, 1883. (No model.) Patented in France April 7, 1883, No. 154,722; in Belgium August 16, 1883, No. 25,517, and in Germany August 18, 1883, No. 36,273.

*To all whom it may concern:*

Be it known that I, HENRY PORT, a citizen of the United States, residing at Vincennes, in the Republic of France, have invented certain new and useful Improvements in Convertible Tools, (for which I have obtained Letters Patent in France, No. 154,722, under date of April 7, 1883; in Belgium, No. 25,517, under date of August 16, 1883, and in Germany, No. 36,273, under date of August 18, 1883;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to that class of tools in which are combined a fixed jaw, a movable jaw, and means to move the latter toward or from the former and rigidly hold said movable jaw in the position to which it has been moved. In tools of this class as heretofore constructed the screw whereby the movable jaw is adjusted toward and from the fixed jaw usually sustains all the strain exerted by the jaws while the tool is being used. This not only tends to warp the screw, but also to speedily wear the thread of the latter, as well as that of the movable jaw in which it works. Furthermore, such tools are usually constructed for a single purpose—that is to say, they are constructed either for use as a wrench, or as a vise or other tool for gripping or holding objects between its jaws.

The primary object of this invention is to construct a tool of this class so as to adapt it for use for various purposes by providing means whereby the movable and the fixed jaws may be readily removed and others capable of performing different functions applied in their place, and whereby a convertible tool capable of performing various functions is provided.

The further object of this invention is to provide means whereby the operating-screw of the movable jaw is relieved of the strain, and whereby such strain is more equally distributed over the other parts of the tool; and, lastly, the invention has for its object to so construct the tool as to adapt it for ready dismemberment and interchange of jaws, and

when so dismembered to occupy but very small space in comparison to the space occupied by tools of this class of usual construction.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of my improved convertible or combination tool adapted for use as a wrench. Fig. 2 is a like view showing the parts of the tool dismembered, and Fig. 3 is an elevation thereof. Figs. 4, 5, and 6 are elevations illustrating the tool converted into a wrench and hatchet, wrench and adz, and hammer and pipe-cutter, respectively. Figs. 7 and 8 illustrate the tool converted into a bench-vise. Fig. 9 is a perspective view of one form of interchangeable locking-ferrule. Figs. 10 and 11 are plan views of the retaining-sleeve E and conical bearing F; and Fig. 12 is a front elevation, partly in section, of the combined hand-lever and screw-driver that serves to operate the movable jaw when the tool is converted into a bench or parallel vise; and Fig. 13 shows the manner of applying the screw-driver to the handle for use.

Like letters of reference indicate like parts wherever such may occur in the above figures of drawings.

The tool is composed of a fixed jaw, A, and a movable jaw, the latter being adapted for adjustment toward and from the former by means of a screw, D D'. The jaw A is provided with a perforation,  $a'$ , of greater diameter at its upper extremity for the passage of a retaining screw-bolt and the reception of its head within the enlarged portion thereof, as shown. The jaw A is further provided with a recess,  $a^2$ , and between the latter and the perforation  $a'$  with a second recess,  $a$ , said recesses being formed in the under face of the jaw.

The movable jaw B is provided with a screw-threaded perforation,  $b$ , through which passes and in which operates the adjusting-screw, and on opposite sides of the threaded perforation  $b$  said jaw is provided with perforations  $b'$   $b^2$ . As stated, the movable jaw is carried and adjusted by a screw, D D', and said screw at its upper end is stepped in the recess  $a$  on the under side of the fixed jaw A, the rotation of the screw for moving the jaw B toward and from jaw A being effected as hereinafter described.

The screw is made in two sections—namely,



the screw proper D and a shank, D'. Near its lower end the diameter of the screw-section D has an enlargement or collar,  $d$ , and at said end the screw is provided with teeth  $d'$ , and is square in cross-section. The section or shank D' is provided at its upper end with teeth  $d''$ , adapted to intermatch with the teeth  $d'$  of section D, and said section D' is square in cross-section throughout its length, except at its lower end,  $d'''$ , where it is cylindrical and screw-threaded, for a purpose which will be presently explained.

E is a retaining-sleeve provided with a perforation,  $e^4$ , enlarged at the upper end to form a seat,  $e^5$ , for the collar or enlargement  $d$  on the section D of the screw, said perforation  $e^4$  terminating in a conical socket,  $e^3$ , that serves as a seat or bearing for a conical sleeve or nut, F. The perforation in the latter is rectangular for the reception of the rectangular toothed portion of the section D of the screw and the toothed upper end of the section D' thereof, and said perforation terminates in a socket,  $f'$ , in which is seated the upper end of the handle H, which is also provided with a rectangular perforation for the passage of the shank D' of the screw. On opposite sides of the perforation  $e$  the sleeve E is provided with a screw-threaded perforation,  $e'$ , and a recess,  $e^2$ , the former coinciding with the perforation  $b'$  of jaw B, and that  $a'$  of jaw A and the latter with the perforation  $b^2$  and recess  $a^2$  in said jaws B A, respectively.

In order to relieve the adjusting-screw D D' from all strain during the operation of the tool, I employ a rod, G', and a screw-rod, G. The former is loosely connected with the jaws A B and sleeve E, it being stepped in the recesses  $a^2$   $e^2$  of the fixed jaw A and sleeve E, respectively. The rod G serves to rigidly connect the sleeve and fixed jaw by being passed through the perforation  $a'$  of the latter and screwed into perforation  $e'$  of the former.

It is obvious that by the use of the parallel rods G G' upon opposite sides of the central operating-screw, the strain is removed from the latter and transferred to the former, whether the tool is used as a wrench, hammer, hatchet, adz, pipe-cutter, or other implement. In other words, the strain is taken up by the parallel rods whichever side of the tool is used.

By connecting the rod G' loosely with the jaws and sleeve E, and adapting the rod G for removal, the tool may not only be readily taken to pieces, so as to occupy a minimum space, but both the fixed and movable jaws are thus also adapted for removal and exchange for a jaw or jaws of other constructions, which make the tool a convertible one. For instance, by removing the fixed jaw A shown in Figs. 1, 2, and 3, and substituting therefor the fixed jaw A shown in Fig. 4, the tool is converted into a wrench and hatchet, or into an adz by substituting the fixed jaw A shown in Fig. 5. Again, by removing both jaws A B and substituting those shown in Fig. 6, the tool becomes a hammer and pipe-cutter.

I would state here that a separate set of jaws need not be provided to convert the tool into a pipe-cutter, as it is obvious that the jaw A shown in Figs. 1 and 2 may be provided with a screw-threaded perforation,  $a^3$ , to receive the shank  $c$  of the cutter C, and the jaw B with recesses or sockets  $b^3$  for the reception of the pins or lugs  $i$ , secured to or formed on the bearing-block I, and that serve to hold said block against movement on the jaw B during the operation of cutting, as plainly shown in said Fig. 6.

When the tool is to be used as a wrench, the cutter and block may be readily removed.

L is a socketed locking-nut in which the lower end of the handle H is seated, and which screws onto the threaded end of section D' of screw D, and serves to rigidly connect all the parts of the tool except the jaws, one of which is mounted on the screw and the other rigidly connected with sleeve E by the screw-rod G, as above explained.

To impart to the tool a still wider range of use, I provide interchangeable ferrules of various constructions. For instance, as shown in Fig. 9, the ferrule or locking-nut L' is provided with two sleeves or sockets,  $l$ , supported by arms  $l'$ , extending from opposite sides of the nut, and with a pointed arm,  $l''$ , and a hooked arm,  $l'''$ , thus providing means for supporting various articles. The sockets may be used for the reception of flag-staffs or candles. From the hook may be suspended a garment or other object, and by means of the pointed arm  $l''$  the tool may be secured to a wall or other support.

Supposing all the parts of the tool to be disconnected, said parts are connected and the screw D D' operates as follows: The two sections D' D<sup>2</sup> of the screw D are first locked together by means of their respective teeth. The sleeve E is then slipped onto the same until the collar  $d$  is seated within the seat  $e^5$  in sleeve E, which holds the said shank and screw against unlocking. The movable jaw B is next screwed on the screw, and the rod G passed through said jaw into the sleeve E. The fixed jaw A is now placed on the upper ends of the rod G' and screw D, and the rod G is passed through jaw A and screwed into sleeve E. The rod G, it will be seen, and as already stated, connects the jaw A, rod G', and the sleeve E rigidly together. The nut F is now slipped onto the shank D' of the screw and into the conical socket  $e^3$  of sleeve E, after which the handle H is slipped onto said section D' until seated in the socket  $f'$  of the nut F, and then the locking nut or ferrule L is screwed onto D', whereby all the parts will be connected together through the medium of the screw and the rod G and assume the position shown in Fig. 1, and the tool will be ready for use. By holding the tool by the sleeve E or the fixed jaw A, and rotating the conical nut F, or the latter and the handle H (if said handle has a rectangular perforation) in one or the other direction, the screw D will be rotated and the jaw



B moved toward or from the jaw A, according to the direction of rotation of the screw.

As will be seen, the tool may be taken to pieces by simply unscrewing the nut L and bolt G.

In operating or working with a tool of this class, especially when used as a wrench, the screw is liable to be rotated and thereby loosen the hold of the wrench on the nut or other device to which it is applied, or on the pipe, when used as a pipe-cutter. To guard against this and lock the screw, I employ a set-screw, O, that impinges upon a friction washer or plate P, Figs. 1 and 2.

By forming the screw of two sections, I adapt the tool for a still wider range of use—namely, I adapt the same for use as a bench or parallel vise, and this is effected as follows: The nut L is unscrewed, the tool taken to pieces, and a pair of vise-jaws, A B, Figs. 7 and 8, supplied in place of the jaws used on the tool at the time. In this case the fixed jaw is constructed so as to adapt it to be secured to a bench—as, for instance, by means of an angular arm, A', as shown in Fig. 7, or by means of a universal or ball-and-socket joint, as shown in Fig. 8—in which case the fixed jaw has at one end a spherical boss, M, adapted to be clamped in a socket that is secured to the bench. By means of the latter construction the vise may be held in any desired position, which is a great advantage and convenience, and to this end I provide a two-part socket, N, the jaws  $n n'$  of which are adapted for adjustment toward or from each other by means of a set-screw,  $n^2$ , as shown in said Fig. 8.

When the tool is used as a bench-vise, the section D' of screw D, the handle H, and locking-nut L are removed, and the sleeve E, by means of the set-screw O, is locked to the screw-section D. To the square-toothed end of the latter section is applied a hand-lever, Q, that is adapted for use as a screw-driver, the interiorly-squared sleeve  $q$  of which is provided with a screw-driver, Q', the upper end,  $q'$ , of which, at the point of junction with the sleeve, is screw-threaded, and screws into a handle, Q<sup>2</sup>, that is of rectangular form exteriorly, and of such diameter as to fit within the sleeve  $q$ , whereby the hand-lever of the vise is converted into a screw-driver, as plainly shown in Figs. 12 and 13.

Of course it will be understood that other means than those shown and described may be employed for locking the screw-sections together; and a locking-nut, L, adapted for uses other than those described in reference to Fig. 9, may be employed for locking the handle and other parts of the tool together. I also do not wish to confine myself to the use of the jaws A B, shown and described, as many other constructions of jaws, which will readily suggest themselves to the skilled mechanic, may be employed to increase the range of usefulness of said tool.

From what has been said it will readily be

understood that great advantages are derived from the novel and peculiar construction of tool—namely, from its convertibility and its adaptability to dismemberment—whereby a kit of tools may be had, and which may be enclosed within a very small space when compared with that occupied by the several tools as now constructed, and of which such kit may be composed. By the use of the parallel rods the strain is effectually removed from the screw, and as both these rods are detachable, should either one or the other become injured, they can be replaced at a trifling expense; but, irrespective of these great advantages, because of the fact that the jaws are both made detachable from the screw and the latter from the handle, either one or the other may readily be removed, when injured or worn, and replaced by a new one.

It will be readily understood that the nut F for rotating the screw D D' may be dispensed with, if desired, and the handle H made the means for rotating said screw; yet I prefer to use said nut F, as it affords a more convenient means for operating the screw, and a better hold, through the medium of the handle, for holding the tool while said screw is operated.

It will further be understood that when the tool is converted into a parallel vise, the nut F may be used to rotate the screw, and a set-screw may be employed to lock said nut thereto and prevent it slipping off the hand-lever Q, in this case being applied to the nut F, instead of applying it directly to the screw, and in practice this means of operating the movable vise-jaw will be found more advantageous, as it protects the screw-section from wear.

Having thus fully set forth the nature and merits of my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a tool in which are combined for co-operation a fixed jaw, a movable jaw, and a screw for adjusting the latter jaw toward and from the former, the combination, with the operating-screw, of fixed jaws and movable jaws adapted to be interchangeably connected for operation with each other and with said screw, as described.

2. In a tool in which are combined for co-operation a fixed jaw, a movable jaw, a screw for adjusting the latter jaw toward and from the former, and means for rotating the screw, made detachable therefrom, the combination, with said elements, of other means attachable to the screw for rotating it independently of said detachable screw-operating devices, as described.

3. In a tool in which are combined for co-operation a fixed jaw, a movable jaw, a screw for adjusting the latter jaw toward and from the former, and means for operating said screw, the combination, with the fixed and movable jaws, of a screw having a two-part shank, de-



vices for rotating the screw, adapted to be detached with one of the screw-shank sections from the other screw-shank section, and means for rotating said screw independently of the detachable screw-operating devices, as described, for the purpose specified.

4. In a convertible tool in which are combined a fixed jaw, a movable jaw, and a screw for adjusting the latter jaw toward or from the former, the combination, with the operating-screw, of interchangeable fixed jaws, and interchangeable movable jaws constructed to convert the tool for various uses, and adapted to be connected for operation with each other and with said screw, as described.

5. In a convertible tool in which are employed for co-operation a fixed jaw, a movable jaw, a screw for adjusting the latter jaw toward or from the former, a nut or handle for operating the screw, and a lock-nut for locking the operating nut or handle to the screw, the combination, with the screw, its operating-nut and the lock-nut, of interchangeable fixed jaws and interchangeable lock-nuts, constructed to convert the tool for various uses, and adapted to be connected for operation with said movable jaw, screw, and operating nut or handle, as described.

6. In a convertible tool in which are combined for operation a fixed jaw, a movable jaw, a screw for adjusting the latter jaw toward or from the former, a nut or handle for operating the screw, and a lock-nut to lock said operating nut or handle to the screw, the combination, with the screw and its operating nut or handle, of interchangeable fixed jaws, interchangeable movable jaws and interchangeable lock-nuts, constructed to convert the tool for various uses, and adapted to be connected for co-operation with said screw and handle, as described.

7. In a convertible tool, in which are combined for co-operation a fixed jaw, a movable jaw, a screw for adjusting the latter jaw toward or from the former, a nut or handle for operating said screw, and a lock-nut for locking the operating nut or handle to the screw, the combination, with the fixed and movable jaws, the adjusting-screw for the latter jaw, and the nut or handle for rotating the screw, of lock-nuts constructed to perform various functions as tools or implements, and adapted to be interchangeably secured to the adjusting-screw for co-operation with the latter, and the fixed and movable jaws, as described.

8. The combination of the jaws A B, sleeve E, screw sections D D', and a nut or handle for rotating the screw-sections, with a lock-nut, L, and a lock-bolt, G, whereby the parts described are locked together for operation, substantially as and for the purposes specified.

9. The combination of the jaws A B, screw D, rod G, and sleeve E, with the set-screw O and friction-washer P, substantially as described, for the purposes specified.

10. The combination, with the jaws A B,

screw D D', rods G G', and sleeve E, of the nut F, handle H, and lock-nut L, all arranged for operation as described, for the purposes specified.

11. A convertible tool in which are combined a detachable fixed jaw provided with means for securing the same to a fixed support, a movable jaw, a screw supported by the fixed jaw at one end for adjusting the movable jaw toward and from said fixed jaw, a support for the opposite end of said screw, parallel rods whereby the fixed jaw is rigidly connected with the screw-support, and the movable jaw guided thereon, and means to rotate the screw, as described, for the purposes specified.

12. In a convertible tool of the class described, the combination of a detachable fixed jaw, A, provided with a spherical boss, M, and the parallel rods G G', with the semi-spherical two-part socket N, the thumb-screw  $n^2$ , a movable jaw, a screw for adjusting the latter jaw toward and from the former and supported at one end from the fixed jaw, a support for the other end of said screw, and means to rotate the latter, all arranged for co-operation substantially as and for the purposes specified.

13. In a convertible tool of the class described, the combination, with the screw-section D, of a hand-lever, Q, for rotating the same, composed of a rectangular hollow handle, and a key or nut provided with a screw-driver connected with and contained by said handle, and constructed for operation as described.

14. In a tool in which are combined for co-operation a fixed jaw, a movable jaw, and a screw for adjusting the latter jaw toward or from the former, the combination, with the fixed and movable jaws, the screw, and support therefor in which said screw rotates freely, and operating devices to rotate the screw, made detachable therefrom, of means for locking the screw-support rigidly to the screw, and other means attachable to said screw for rotating the latter independently of the detachable screw-operating devices, as described, for the purpose specified.

15. In a tool in which are combined for co-operation a fixed jaw, a movable jaw, a screw for adjusting the latter jaw toward and from the former, and means for rotating said screw, the combination, with the fixed and movable jaws, the screw, and a nut for rotating the latter, of a lever constructed to perform the functions of a screw-driver, and adapted to be connected to the screw for operating the same independently of the operating-nut, as described, for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand this 11th day of August, 1883.

HENRY PORT.

Witnesses:

J. PITT LOWE,

ROBT. M. HOOPER.