

No. 758,038.

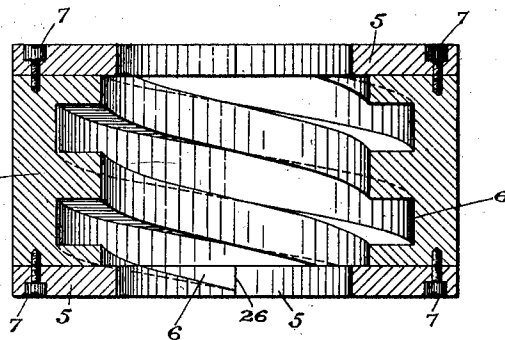
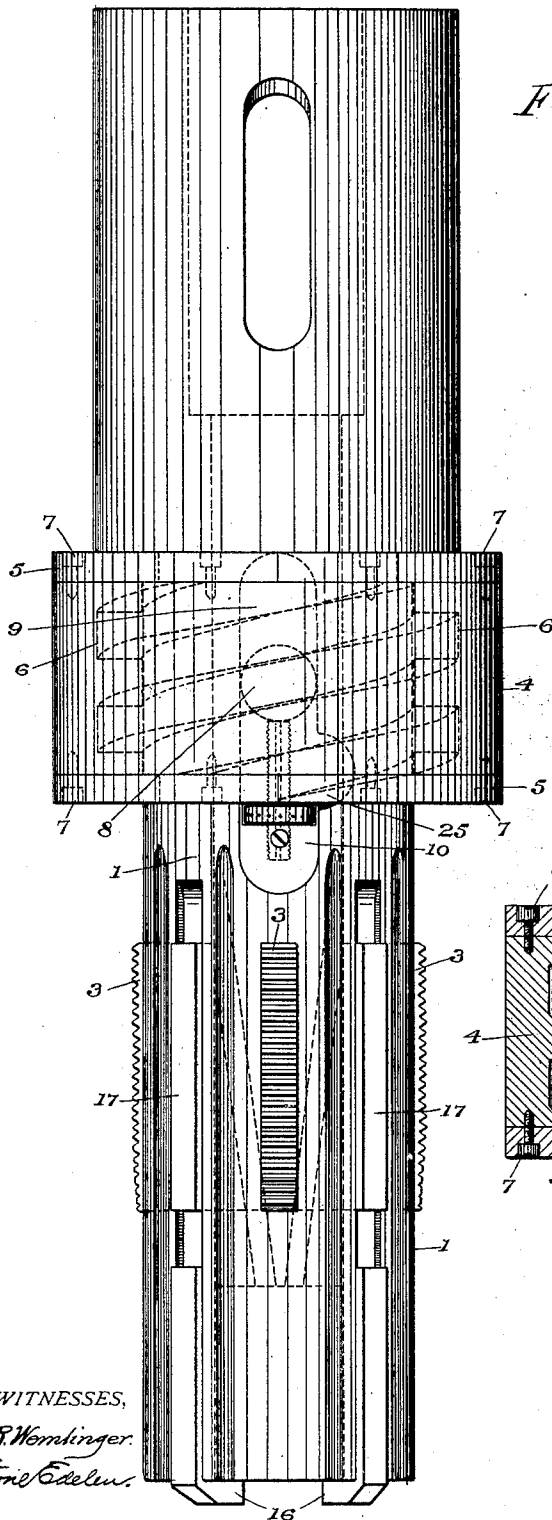
PATENTED APR. 26, 1904.

J. H. ALLENDORFER & M. OWENS.
COMBINATION TOOL FOR BORING AND TAPPING.

APPLICATION FILED SEPT. 5, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



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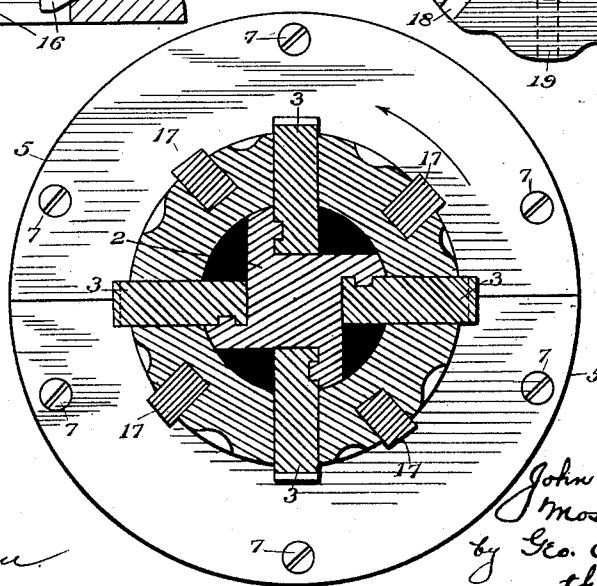
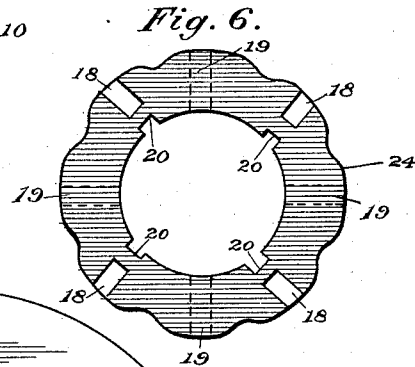
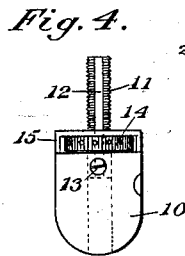
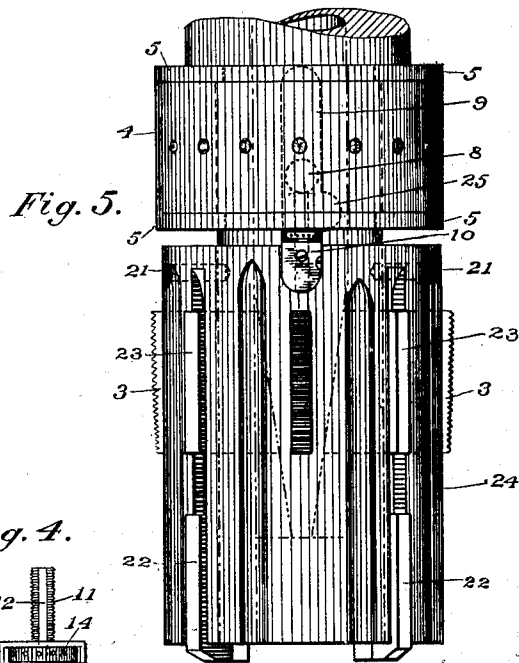
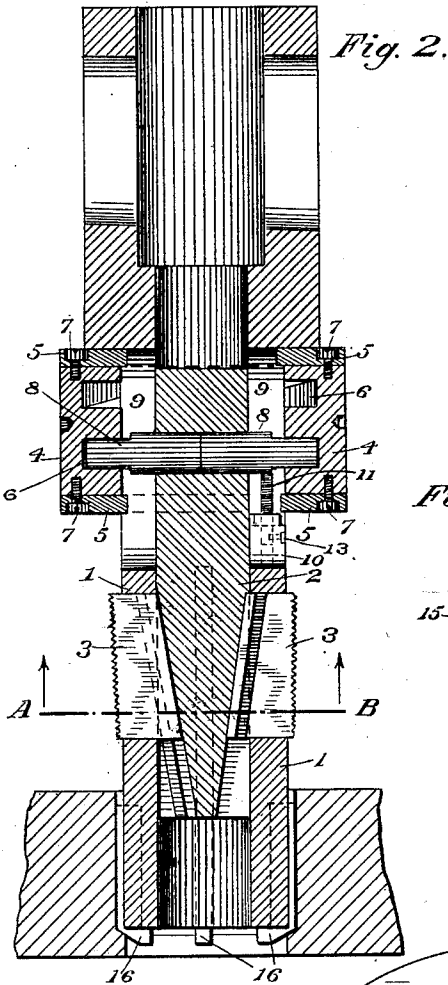
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2 SHEETS—SHEET 2.



Witnesses

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UNITED STATES PATENT OFFICE.

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COMBINATION-TOOL FOR BORING AND TAPPING.

SPECIFICATION forming part of Letters Patent No. 758,038, dated April 26, 1904.

Application filed September 5, 1902. Serial No. 122,184. (No model.)

To all whom it may concern:

Be it known that we, JOHN H. ALLENDORFER, residing in the borough of Westmont, and MOSES OWENS, residing in the city of Johnstown, in the county of Cambria and State of Pennsylvania, citizens of the United States, have invented certain new and useful Improvements in Combination-Tools for Boring and Tapping; and we 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.

Our invention relates to combination-tools for boring and tapping which are provided with reaming-cutters in addition to the threading-dies, so as to ream or clean out the hole to be tapped in advance of the threading-dies, and in which said dies may be withdrawn when the work is finished.

Certain objects of our invention are to provide an apparatus that will operate as above described, simple and cheap in construction, effective in use, and capable of performing its duty in the minimum time; and to these ends our invention consists of certain novel features, which we will proceed to describe and hereinafter particularly point out in the claims.

Our improved combination-tool consists, primarily, of a hollow stock or die-holder having longitudinal radial slots for removably holding the cutting-dies and parallel grooves for holding reaming-cutters placed therein. Within said hollow stock or die-holder is a mandrel cylindrical at its upper end and tapering at its lower extremity, said tapering end having longitudinal inclined splines for engaging with corresponding grooves or rabbets in the threading-dies, this arrangement thus serving to removably secure and adjust said dies in various positions as desired. Two pins, each formed of a separate round piece flattened at its outer extremity, rest in a cylindrical hole provided in the upper portion of the mandrel, and said flattened ends project so as to engage a square screw-thread or cam-surface cut in a sleeve or nut, which is free to revolve around the hollow stock or die-holder aforesaid. Said

pins and sleeve cooperate to set said mandrel for adjusting the threading-dies outwardly or inwardly and for collapsing said dies previous to withdrawing the tool.

The sleeve or nut before mentioned is provided at each end with a flat collar or washer the inside diameter of which is less than that of the sleeve, while the hollow stock or die-holder on which it is mounted is provided with corresponding circumferential grooves in which the inner edges of said collars or washers engage, so that said collars while forming part of and revolving with said sleeve or nut also prevent its movement in the direction of the axis of the stock or die-holder. The pins referred to, however, are adapted to travel longitudinally of the axis of said stock or die-holder, but are limited to this motion by the sides of the slots formed in the said stock or die-holder through which they project. Therefore when the sleeve or nut is given the rotary motion above mentioned the pins are caused to move longitudinally of the stock or die-holder, thus carrying with them the mandrel, which by means of its tapering and splined end causes the threading-dies to contract or expand as the said mandrel is moved up or down.

An adjustable stop is provided to limit the downward motion of the pins and the mandrel carrying them, thereby restricting the expansion of the threading-dies to the diameter desired. This adjustable stop consists of an oblong body portion provided with a longitudinal cylindrical hole in which a screw-threaded stud is arranged, said stud being provided with a longitudinal slot or keyway, cooperating with a corresponding set-screw located in the body portion of the stop for the purpose of preventing the rotation of said stud. Said screw-threaded stud is further provided with a cylindrical nut mounted in the body portion of the stop, the revolution of which moves and adjusts said stud as desired, and as said stud is arranged in the line of travel of the pins aforesaid its adjustment thus limits the downward motion of said pins to any degree desired.

We also provide a number of shells of ap-

proximately annular section made of various external diameters to carry taps or threading-dies of different radial lengths, corresponding with the various standard sizes of internal screw-threads, each of said shells being of the same internal diameter, equal to the external diameter of the hollow stock or die-holder, which thus adapts them for use on the same stock, so that a change from a smaller to a larger size of tapping or threading dies, or vice versa, can be made in a simple manner and in a very short time.

Having thus given a general description of our invention, we will now in order to make the matter more clear refer to the annexed two sheets of drawings, which form part of this specification, and in which like figures refer to like parts.

Figure 1 is a front elevation of our combination-tool. Fig. 2 is a central vertical sectional elevation of the same. Fig. 3 is an enlarged transverse sectional plan on the line A B of Fig. 2 looking in the direction of the arrows. Fig. 4 is an adjustable stop for use in setting the dies to a given diameter. Fig. 5 is a vertical front elevation of the lower part of our tool, showing an auxiliary shell secured thereon. Fig. 6 is a transverse section of and looking upwardly at a representative one of said shells, and Fig. 7 is a central vertical section through the sleeve or nut.

Referring now to the various characters of reference upon the drawings, 1 is a hollow stock or die-holder provided with longitudinal slots radially arranged and parallel grooves for carrying threading-dies and reaming-cutters, respectively.

2 is a mandrel having a tapering end of special form, said mandrel being adapted to travel lengthwise within the stock or die-holder 1.

3 represents threading-dies having inclined inner edges and provided with slotted grooves in their sides adjoining and parallel to the inclined edges.

4 is a sleeve or nut provided with interior screw-threads, said sleeve or nut being revolvably mounted on the stock or die-holder 1.

5 represents thin collars or washers, each composed of two semi-annular pieces, attached to the sleeve or nut 4, which washers work in circumferential grooves in the stock or die-holder 1 to prevent the sliding or longitudinal movement of said sleeve or nut 4 thereon.

6 represents square screw-threads on the interior of the sleeve or nut 4, and 7 represents screws for fastening the collars or washers 5 to the sleeve or nut 4. The upper portion of the stock or die-holder 1 is provided with a hollow head having a keyway therein adapted to fit in the usual manner on a drill or lathe spindle.

8 represents pins revolvably mounted in the mandrel 2, the ends of which pins are flattened and project from said mandrel within the screw-threads 6, as shown.

9 represents vertical radial slots in the stock or die-holder 1, through which the pins 8 project, as shown. It will be noted that the pins 8, while actually in line with each other, are composed of two separate pieces, each flattened at its outer extremity for the purpose of engaging the cam or threaded surface 6 of the sleeve or nut 4, as before mentioned. This is a very valuable improvement, as it permits each end of said pins to adapt itself to the angle or inclination of the thread or cam surface irrespective of the other pin, thus conducing to ease in manipulation, as with one solid pin it would be necessary to carefully cut the thread 6 and still more carefully adjust the ends of the pin to the inclination of said thread in order to prevent binding, which latter never occurs in our improved arrangement of separate and individual pins.

Referring to the radial vertical slots 9, which are formed within the hollow stock or die-holder 1 and in which said pins 8 are adapted to travel vertically, said slots 9 are each provided with an approximately semicircular recess 25, which allows a limited horizontal movement of the pins 8 at this point. As shown in Figs. 1 and 7, it will be noted that the thread or cam surface 6 is prolonged through half of the lower collar 5, stopping abruptly at the surface 26 of the other collar, at the junction of the two halves thereof. These arrangements provide means for unlocking the dies when it is desired to remove them to allow a shell to be slipped on or for some other reason. To accomplish this, we first remove the adjustable stop, then turn the sleeve or nut 4 to the right until the pins 8, following the thread 6, move downward until they reach the end of said thread. At this point the flat surface 26 of the adjoining half of the lower collar 5 abuts against the pins 8 and carries them around into the semicircular recess 25, above referred to. This latter motion of the pins 8 causes the mandrel to turn within the hollow stock or die-holder in the direction shown by the arrow in Fig. 3, thus effectively unlocking the dies 3, which can then be pulled out without further manipulation.

10 is the body portion of the adjustable stop used for setting the dies to various diameters.

11 is a screw-threaded stud which slides within the body of the stop 10.

12 is a longitudinal slot or keyway in the stud 11.

13 is a set-screw the end of which serves as a key and projects within the slot 12 to prevent the rotation of the stud 11.

14 is a circular nut provided with holes in its periphery, mounted upon the stud 11 for the purpose of adjusting the same.

15 is a yoke integral with the body of the stop 10 for confining and limiting the circular nut 14.

16 represents reaming-cutters mounted on

the forward or cutting end of the stock or die-holder 1. 17 represents other reaming-cutters mounted upon said stock or die-holder 1 between and parallel to the threading-dies 3.

24 is a shell of approximately annular section provided with grooves, as indicated in Figs. 5 and 6, the illustration of said shell being merely representative, as various similar ones of different sizes and diameters are used in order to enable our combination-tool to cut threads of all sizes, as will be readily understood.

18 represents longitudinal grooves in the exterior of the shell 24 for holding reaming-cutters similar to those marked 16 and 17.

19 represents radial slots cut through the body of the shell 24 for the passage of the threading-dies.

20 represents longitudinal grooves provided in the interior surface of the shell 24 for allowing it to be slipped upon the stock or die-holder 1 without removing the reaming-cutters 16 and 17.

21 represents set-screws for securing the shell 24 to the stock or die-holder 1.

22 represents reaming-cutters (shown in Fig. 5) mounted on the forward or cutting end of the shell 24, said reaming-cutters being similar to those marked 16 in Figs. 1 and 2, and 23 represents reaming-cutters mounted on the shell 24 between the threading-dies, as shown in Fig. 5, said reaming-cutters 23 being similar to those marked 17 in Fig. 1.

It will be noted that the reaming-cutters 16 are mounted on the forward or cutting end of the mandrel, so as to bore out the hole to be tapped in advance of the threading-dies. In operation of tools of this character it is often found that the teeth of the threading-dies are broken away by the sharp edges of the thread striking the base of the cutting-teeth, to prevent which we provide another set of reaming-cutters, 17 or 23, arranged one between each pair of threading-dies 3, the cutting edges of which reaming-cutters extend a small fraction of an inch farther from the axis of the tool than that part of the tapping-dies which forms the apex of the threads, as indicated in Fig. 3, with respect to the reaming-cutters 17, so that they merely shave the sharp edges of the threads, and thus accomplish the desired result—namely, to prevent breakage and prolong the life of the threading-dies.

Referring to the adjustment of the threading-dies, it will be understood that the primary purpose of making them adjustable outwardly is to compensate for the reduction in diameter occasioned by the wear of said dies and their sharpening from time to time, another object being to allow for the different sizes, as is necessary when retapping worn-out flange-couplings or the like.

To facilitate the escape of the cuttings, the hollow stock or die-holder 1 is cut away or fluted on its circumference at the side of each

die and reaming-cutter, as shown in Figs. 1 and 3.

Referring to the representative shell shown in cross-section in Fig. 6 and in position in Fig. 5, these shells are provided with two sets of reaming-cutters similar to those used on the hollow stock 1 and intended to perform the same functions, said reaming-cutters being located within the grooves 18, while the threading-dies pass through the slots 19. The inner surfaces of the shells are provided with grooves, as shown at 20, to allow them to be slipped over the hollow stock or die-holder 1 without removing the reaming-cutters which are secured thereon, and it will also be noted that the shells are grooved or fluted longitudinally between the reaming-cutters and dies for the purpose of giving clearance and allowing the escape of the cuttings. The diameter of the shells may be greater than that of the one shown for the purpose of supporting and holding larger dies, so as to increase the diameter of the tool, and it will also be understood in this connection that the same stock or die-holder may be used with various sizes of shells, so that while the tool is made of standard sizes as regards the shells and lengths of the dies the same stock will answer for various sizes, thus providing an apparatus consisting of few parts, but at the same time covering a wide range of use.

By means of the improvements as described herein we can change and adjust the diameter of our tool from the smallest to the largest, or vice versa, in a very short time, as may be readily understood.

Although we have shown our improvements in considerable detail, we do not limit ourselves to the exact and specific particulars of the arrangement or forms shown and described, but may use such substitutions, modifications, or equivalents thereof as are embraced within the scope of our invention and as pointed out in the claims.

Having thus given a description of our invention, what we claim, and desire to secure by United States Letters Patent, is—

1. In a combination-tool for boring and tapping, a hollow stock provided with external longitudinal grooves, radial slots in said hollow stock and radially-adjustable threading-dies fitted therein, a mandrel tapering at its lower end and mounted within the axial opening of said hollow stock, splines on the tapering end of said mandrel cooperating with corresponding grooves near the inner edges of the threading-dies aforesaid, a rotatable internally-threaded sleeve mounted on said hollow stock, projections on said mandrel cooperating with said internal threads whereby the mandrel may be adjusted longitudinally by the revolution of said sleeve, vertical radial slots in said hollow stock through which said projections extend and are guided, a recess in the side of each of said radial slots for

allowing a limited lateral movement of the projections aforesaid, a flat or stop surface at the ends of said internal threads whereby the said projections may be carried into the said
5 recesses by the revolution of the sleeve, thereby unlocking the dies from the mandrel by the partial revolution of the latter.

2. In a combination-tool for boring and tapping, an internal mandrel provided with a
10 tapering end for adjusting the threading-dies, the upper portion of said mandrel being provided with a transverse cylindrical hole in which are mounted two pins each composed
15 of a cylindrical piece flattened at its outer extremity for and in engagement with the internal threads of an adjusting-nut mounted upon a hollow stock or die-holder containing said mandrel.

3. In a combination-tool for boring and tapping, a series of adjustable threading-dies
20 mounted on a hollow stock, a mandrel mounted within said hollow stock and provided with a tapering end in operative connection with said dies, a rotatable sleeve provided with interior screw-threads and mounted on said
25 stock, said sleeve having at each end a flat collar formed of two separate semi-annular pieces the interior surfaces of which are fitted within corresponding circumferential grooves
30 formed in the periphery of the stock aforesaid, pins mounted in and projecting from said mandrel and engaging with said screw-threads, whereby the threading-dies are adjusted by the revolution of said sleeve.

35 4. In a combination-tool for boring and tapping, a hollow stock, adjustable threading-dies mounted therein, a mandrel provided with a tapering end mounted within said hollow stock, said tapering end being arranged to co-
40 operate with and adjust the threading-dies aforesaid, an adjustable stop mounted upon said stock; said stop being composed of a body portion and a screw-threaded stud adapted to move longitudinally therein, and means
45 for adjusting said stud whereby the movement of said mandrel is limited as desired.

5. In a tool for boring and tapping, a series of threading-dies mounted upon a hollow stock, an internal adjusting-mandrel mounted
50 therein, an adjustable stop mounted in said stock and cooperating with a projecting portion of said mandrel; said stop being composed of a body portion secured to said hollow stock, a screw-threaded stud provided
55 with a longitudinal slot and adapted to move lengthwise within said body portion, a set-screw projecting within the slot aforesaid, and a nut for adjusting or setting the screw-threaded stud, whereby the longitudinal movement
60 of the said mandrel is limited as desired.

6. In a tool for boring and tapping provided with a series of adjustable threading-dies mounted upon a hollow stock, a mandrel having a tapered end arranged to cooperate with

and adjust the threading-dies aforesaid; an
65 adjustable stop composed of a body portion removably secured to said hollow stock, a screw-threaded stud mounted on said body portion and provided with a longitudinal slot, a set-screw projecting within said slot, a circular
70 nut threaded upon said stud and mounted within the framework of said body portion, said screw-threaded stud being located in the line of travel of a projection on said mandrel whereby the movement of the same
75 may be limited as desired.

7. In a combination-tool for boring and tapping, a hollow stock provided with external longitudinal grooves, a series of adjustable
80 threading-dies mounted within radial slots in said hollow stock, a mandrel mounted within said hollow stock and provided with a tapering end having splines or projections to cooperate with corresponding inclined grooves
85 near the inner edges of said threading-dies, an internally-threaded rotatable sleeve mounted on said hollow stock and provided at each end with a flat collar formed of two separate semi-annular pieces the interior edges of which
90 project within circumferential grooves cut in the periphery of the hollow stock aforesaid, the upper portion of said mandrel being provided with a transverse cylindrical hole in which are mounted two pins each composed
95 of a cylindrical piece flattened at its outer extremity for engagement with the internal screw-threads of the sleeve aforesaid; an adjustable stop mounted upon said hollow stock and arranged in the line of travel of one of
100 said pins whereby the adjustment of said dies is made as desired, by revolving said sleeve until said adjustable stop limits the movement of said mandrel.

8. In a combination-tool for boring and tapping, a hollow stock, a series of movable threading-dies mounted therein, an adjusting-mandrel provided with a tapering end having
105 splines or projections cooperating with corresponding inclined grooves near the inner edges of said threading-dies, a transverse cylindrical hole in the upper portion of said mandrel in which are mounted two projecting pins, radial slots in said hollow stock in which said
110 pins are adapted to move vertically, said radial slots being provided with recesses at one side for allowing a limited lateral movement of the pins aforesaid, whereby said mandrel is disengaged from the threading-dies allowing their withdrawal.

9. In a combination-tool for boring and tapping, a hollow stock, a series of adjustable
115 threading-dies mounted therein; a mandrel located within the axial opening of said stock and having a tapering end provided with longitudinal splines or projections cooperating with corresponding inclined grooves near the inner edges of said threading-dies, transverse
120 pins mounted in the upper portion of said

mandrel, vertical radial slots in said hollow stock through which said pins project and are guided, recesses in the sides of each of said radial slots, whereby said mandrel is unlocked from the threading-dies when it is turned to bring said pins within said recesses.

10 10. In a combination-tool for boring and tapping, a hollow stock, a series of adjustable threading-dies mounted therein; a mandrel located within the axial opening of said stock and having a tapering end provided with longitudinal splines or projections for cooperating with corresponding inclined grooves near the inner edges of said threading-dies, transverse pins mounted in the upper portion of said mandrel, vertical radial slots in said hollow stock through which said pins project and are guided, recesses in the sides of each of said radial slots for allowing a limited lateral movement of the pins aforesaid therein, a rotatable sleeve mounted on said hollow stock and provided with internal screw-threads engaging the ends of the pins aforesaid, a flat surface at the lower ends of said threads adapted to carry the transverse pins laterally into the before-mentioned recesses thereby turning said mandrel through a fraction of a revolution and unlocking its splined end from the threading-dies aforesaid.

30 11. In a combination-tool for boring and tapping, a hollow stock or die-holder, with reaming-cutters projecting therefrom, an annular shell mounted upon said stock and provided with external longitudinal grooves having two sets of reaming-cutters mounted therein, one in advance of the other, and

means for securing said shell upon said hollow stock.

12. In a combination-tool for boring and tapping, a hollow stock or die-holder, with reaming-cutters projecting therefrom, an annular shell removably secured upon said stock and provided with external longitudinal grooves having two sets of reaming-cutters mounted therein, one in advance of the other, said shell being also provided with internal longitudinal grooves that fit over the reaming-cutters which are mounted upon the exterior of the hollow stock or die-holder.

13. In a combination-tool for boring and tapping, a hollow stock provided with radial slots, an annular shell mounted upon said hollow stock and provided with radial slots registering with those of the hollow stock aforesaid, adjustable threading-dies located within said radial slots; a tapering mandrel mounted within the axial opening of said hollow stock in operative connection with the threading-dies aforesaid, external longitudinal grooves formed in said shell having two separate sets of reaming-cutters mounted therein, one in advance of the other, means for adjusting said mandrel and for securing said shell to the hollow stock aforesaid.

In testimony whereof we hereto affix our signatures in the presence of two witnesses.

JOHN H. ALLENDORFER.
MOSES OWENS.

Witnesses:

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STONE EDELEN.