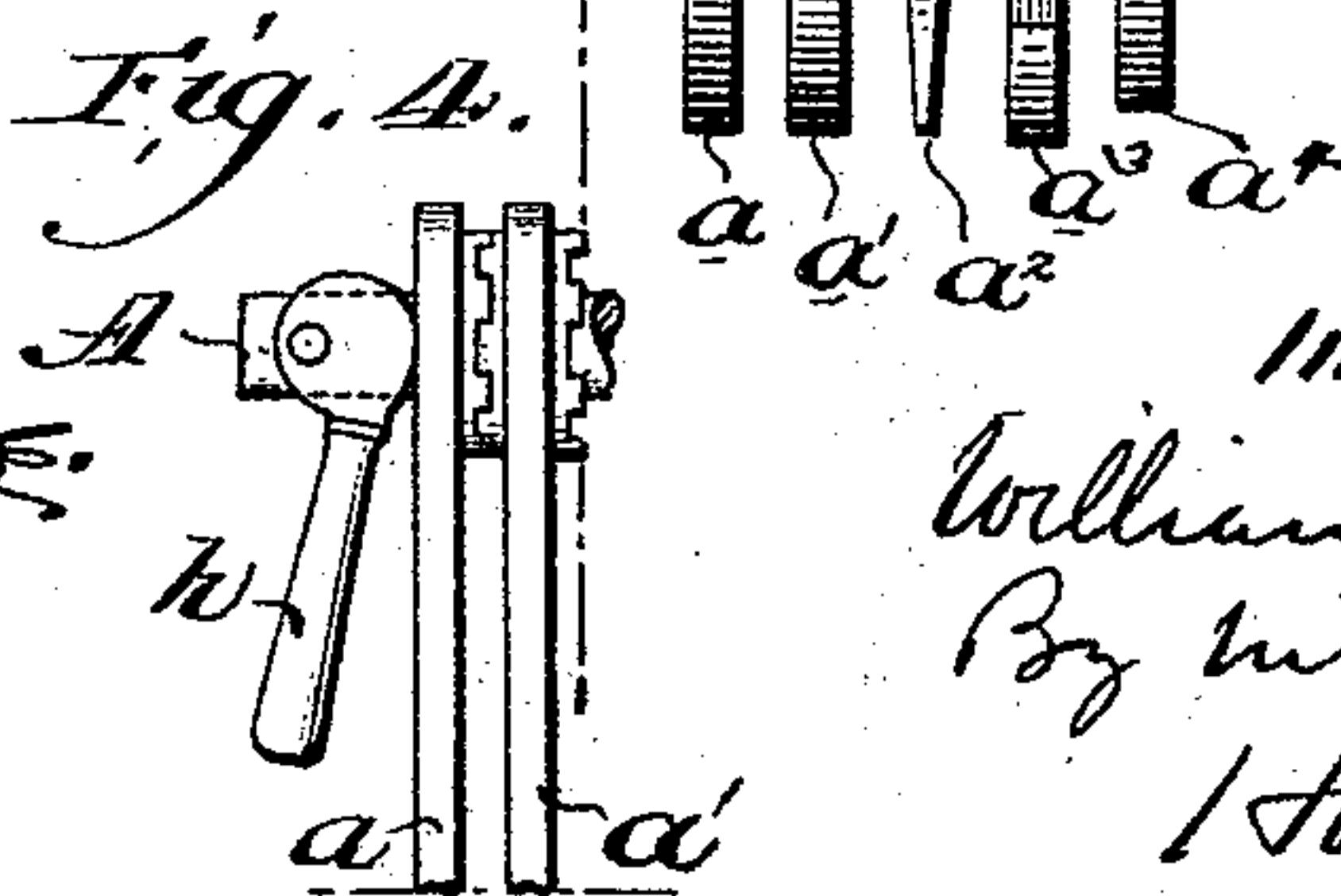
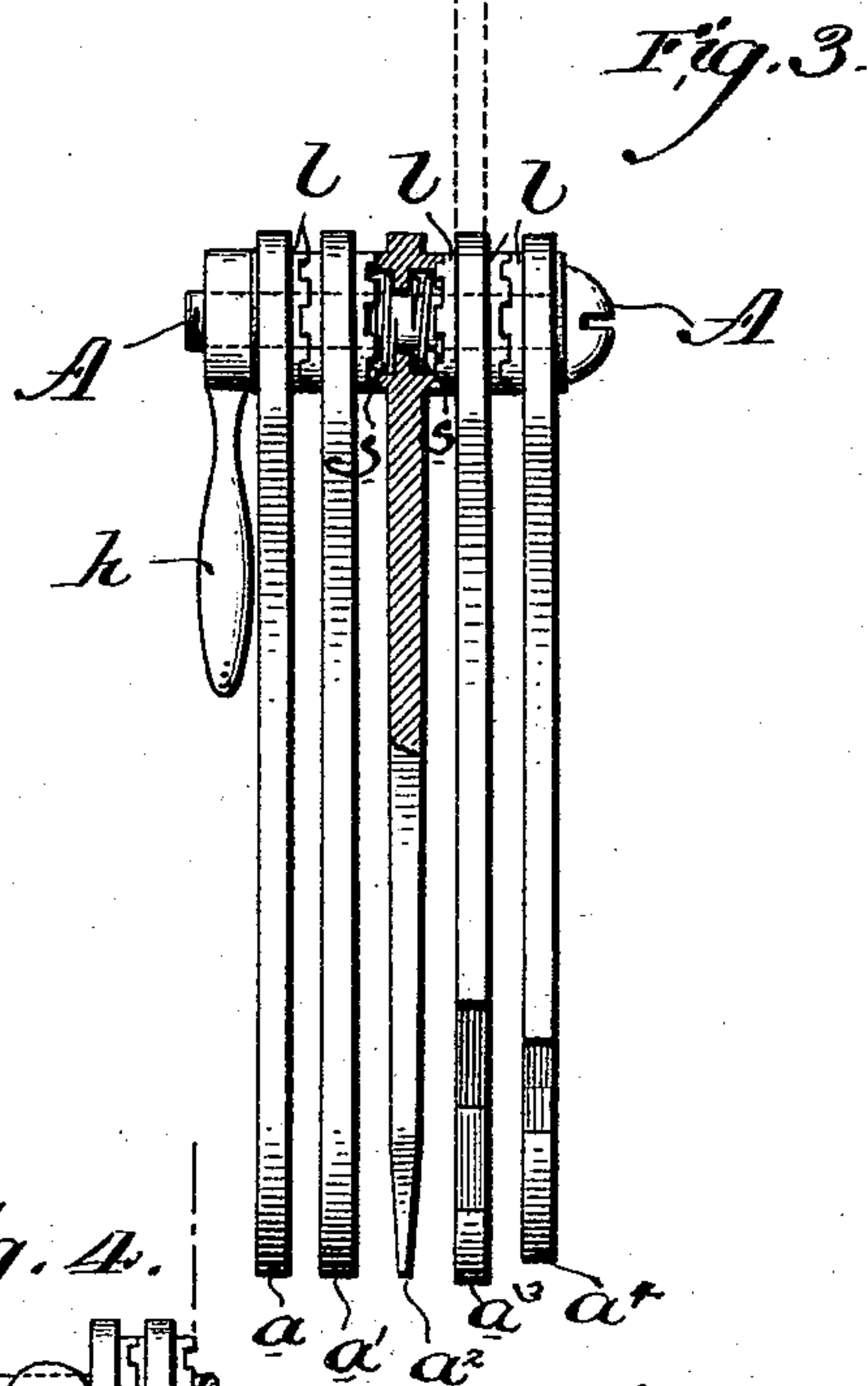
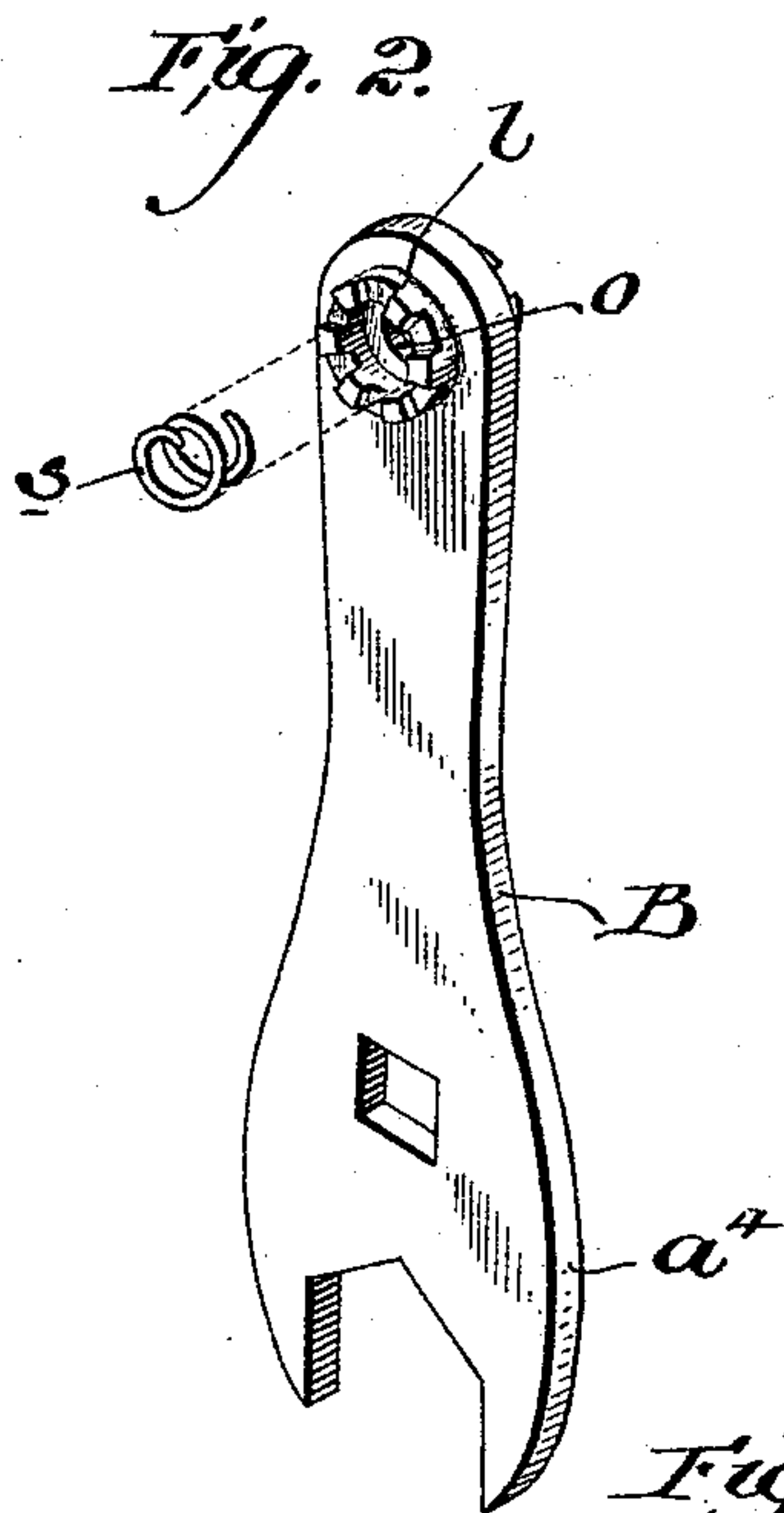
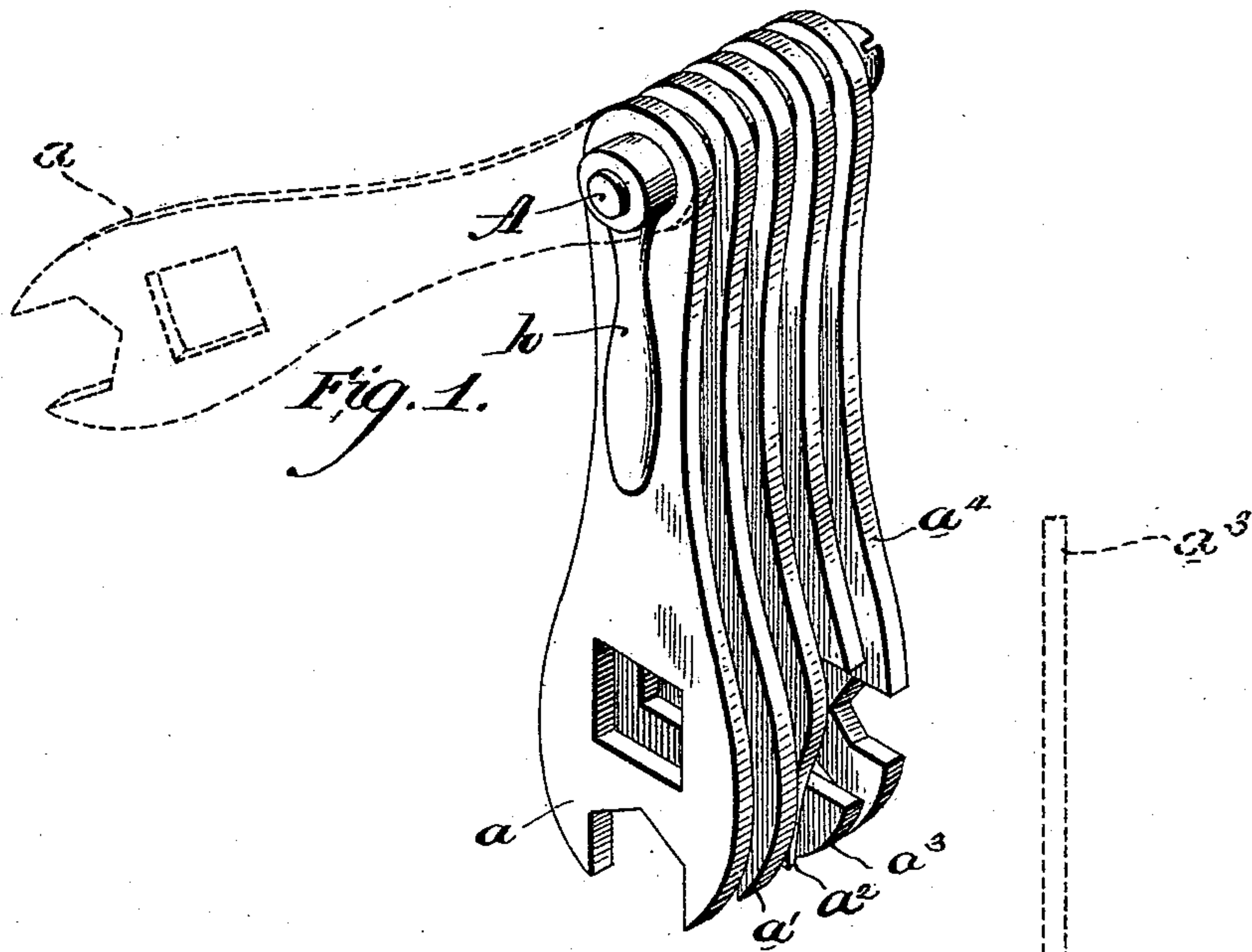


(No Model.)

W. W. SHOE.  
COMBINATION WRENCH.

No. 496,913.

Patented May 9, 1893.



WITNESSES:

*David Williams*

*J. Henderson*

INVENTOR:

*William W. Shoe*  
By his Attorney,  
*Horace Pettit*



# UNITED STATES PATENT OFFICE.

WILLIAM W. SHOE, OF NETHER PROVIDENCE, PENNSYLVANIA.

## COMBINATION-WRENCH.

SPECIFICATION forming part of Letters Patent No. 496,913, dated May 9, 1893.

Application filed February 1, 1893. Serial No. 460,592. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM W. SHOE, of Nether Providence, Delaware county, State of Pennsylvania, have invented a certain new and useful Improvement in Combination-Wrenches; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification.

My invention has relation to adjustable pocket tools, and consists in a combination wrench composed of two or more wrench blades adjustable upon each other and capable of being rigidly secured at any relative angle to each other in position for use through the medium of engaging lugs and clamp, as hereinafter particularly described and claimed.

The object of my invention is to provide a compact, portable combination wrench containing two or more wrench blades to fit different sized nut heads wherein the blade desired to be used may be adjusted at any desired angle rigidly to the line of the other blades which operate as a handle. By this construction I secure not only a compact portable pocket wrench capable of fitting various sized nuts, but also one in which the wrench blades not in use operate as a handle for the one in use, securing increased leverage, and further a construction by which the nut to be operated upon may be reached and freely turned though in a comparatively inaccessible portion of a machine by the adjustment of wrench blade upon the blades constituting the handle to any desired angle. By my improved construction when the wrench blade is properly adjusted it is impossible for it to slip upon the other blades, and further when the clamp is released the respective blades automatically disengage themselves from each other to allow of the desired ready adjustment to any position.

In the accompanying drawings Figure 1 is a perspective view of my improved combination wrench in its compact portable position. Fig. 2 is a detached perspective view of one of the wrench blades. Fig. 3 is an end elevation partly in section. Fig. 4 illustrates a modified construction of clamp for engaging the

wrench blades together, instead of the screw shown in the other figures.

In the accompanying drawings I illustrate one form of my invention as comprising five wrench blades in combination,  $a, a', a^2, a^3, a^4$ , which are secured together upon the transverse bolt, A, headed at one end and preferably provided with a screw-thread at the other end; upon the screw-threaded end a screw-threaded lever,  $h$ , is provided; through each wrench blade at the upper end an orifice,  $o$ , is provided, through which the bolt, A, passes.

Around the orifice,  $o$ , upon each wrench blade I provide integrally a circularly disposed series of lugs or teeth,  $l$ , which may be of any desired number, adapted to engage in similar lugs or teeth alternately disposed in the opposite blade. In the construction shown the outer blades,  $a, a^4$ , have only their inner surfaces provided with the lugs,  $l$ , while the inner blades,  $a', a^2, a^3$ , have the lugs,  $l$ , provided upon each of the two faces of the blade around the orifice,  $o$ , from the nature of the construction of the device. The circular disposition of the lugs,  $l$ , describe a circumferential line slightly greater than the circumference of the orifice,  $o$ , to provide a recess for the reception of a short spiral spring,  $s$ , around the bolt, A, one of said springs,  $s$ , being provided between each of the wrench blades for the purpose of throwing the wrench blades away from each other and disengaging the lugs,  $l$ , when the lever,  $h$ , is turned on the bolt, A, releasing the blades. By this automatic disengagement of the lugs any of the blades may be readily adjusted upon the other blades to any desired angle, either fully extended as shown in the dotted lines in Fig. 3, or partially extended as shown in the dotted lines in Fig. 1 and then secured. According to the number of lugs,  $l$ , will the number of angles at which the blades may be set be varied.

Instead of the screw-threaded lever,  $h$ , and the screw-threads provided upon the end of the bolt, A, other means may be employed for clamping the wrench blades together such as the eccentric or cam construction shown in Fig. 4. When it is desired to secure the wrench blades either in one compact nest or at an angle to each other, as for use, the lever,



*h*, is turned on the bolt, *A*, the springs, *s*, compressed and the opposite lugs engaged into each other rigidly holding the respective blades in the desired position.

5 The adjustable blades may be provided with any sized square or multi-angular orifice or slot for adaptation to the nut head or bolt. Other tools may also be employed, if desired, in the nested combination, as for instance a  
10 screw driving blade, *a*<sup>2</sup>, illustrated in the drawings or other tool.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

15 1. A nested combination wrench consisting of two or more blades, transverse orifices provided in one end of the blades, a headed bolt provided through said orifices and securing clamp provided on the outer end of said bolt  
20 impinging against the outer face of the outermost blade, series of lugs circumferentially disposed upon the respective blades around said transverse orifice upon the face of each blade adapted to engage and register in the  
25 oppositely disposed lugs of the opposite blade.

2. A nested combination wrench consisting of two or more blades, transverse orifices provided in one end of the blades, a headed bolt provided through said orifices and securing  
30 clamp provided on the outer end of said bolt impinging against the outer face of the outermost blade, a series of lugs circumferentially disposed upon the respective blades around said transverse orifice upon the face of each  
35 blade adapted to engage and register in the oppositely disposed lugs of the opposite blade,

and spiral springs provided around said transverse bolt between the wrench plates for automatically disengaging the lugs when the clamping lever is released. 40

3. A combination wrench consisting of two or more blades, a headed bolt provided transversely through one end of said blades in orifices provided for the purpose, said bolt having a screw-threaded end protruding beyond 45 the line of the outermost blade, a lever provided upon said bolt, lugs provided upon each of the opposite faces of the respective blades, circumferentially disposed around said transverse bolt, and spiral springs provided around 50 said transverse bolt for automatically disengaging the lugs when the lever is released.

4. A combination wrench consisting of a series of tool blades, orifices provided in one end of said blades, transverse bolt, *A*, provided through said orifices, *o*, having a screw-threaded protruding end, screw-threaded lever, *h*, provided upon the screw-threaded protruding end of the bolt, *A*, circumferentially 55 disposed lugs, *l*, integrally provided upon the opposing faces of the respective blades around the orifice, *o*, said lugs adapted to register and engage with the opposite lugs, and spiral springs, *s*, provided within the lugs, *l*, and around the bolt, *A*, between the respective 65 blades, substantially as described.

In witness whereof I have hereunto set my hand this 31st day of January, A. D. 1893.

WILLIAM W. SHOE.

Witnesses:

HORACE PETTIT,  
W. B. SHOE.