C. E. GROSS, JR.

AUTOMATIC TAP.

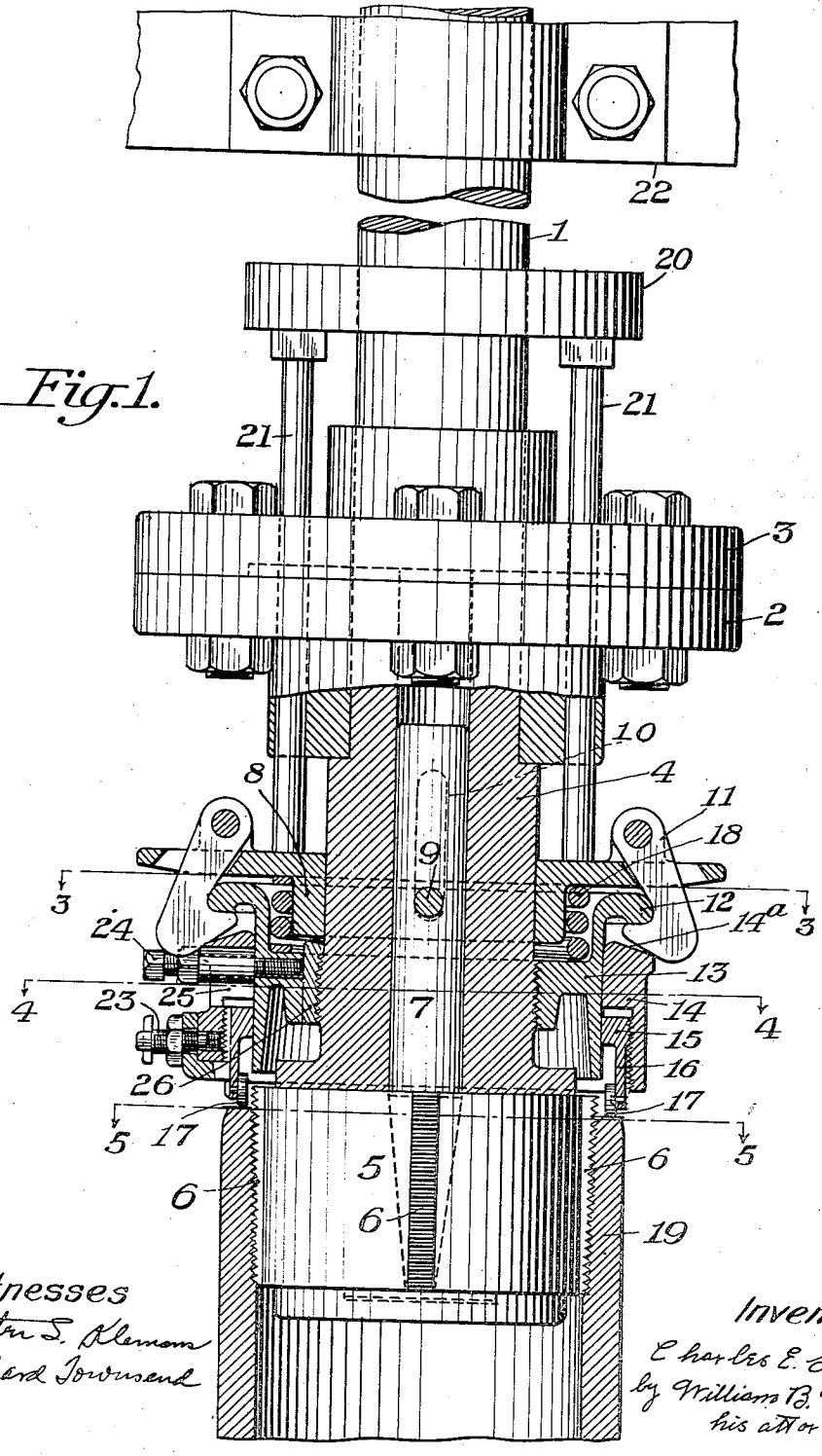
APPLICATION FILED NOV. 26, 1917.

1,308,902.

Patented July 8, 1919.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses
Walter S. Klemm
Richard Townsend

Inventor
Charles E. Gross jr.
by William B. Wharton
his attorney

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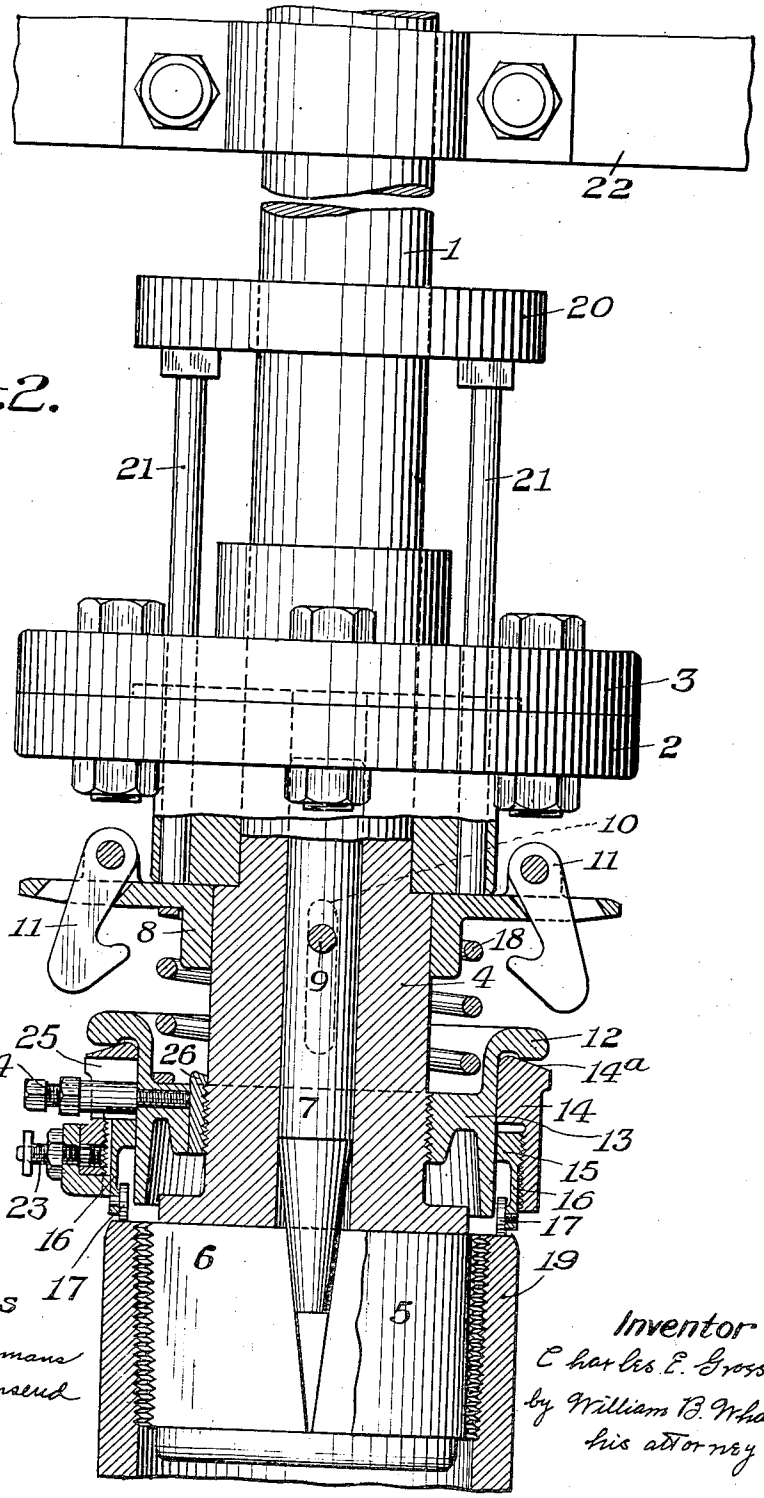
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig 3.

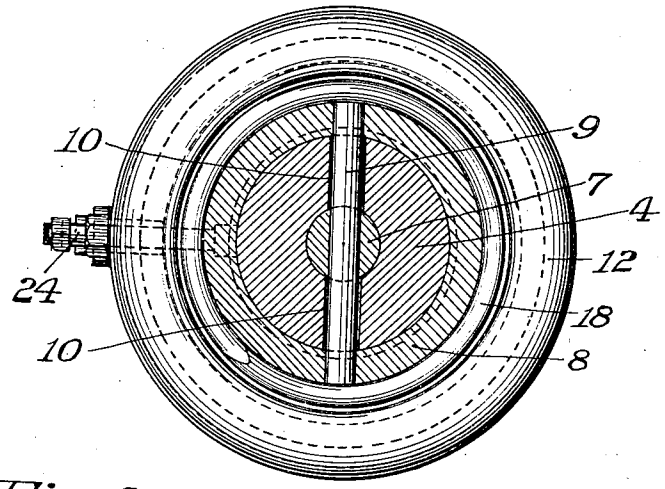


Fig. 4.

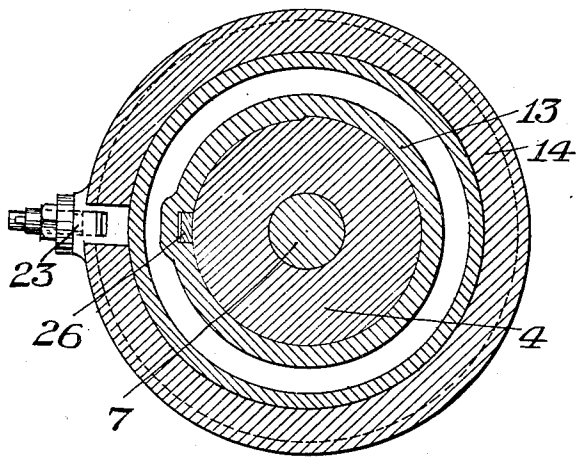
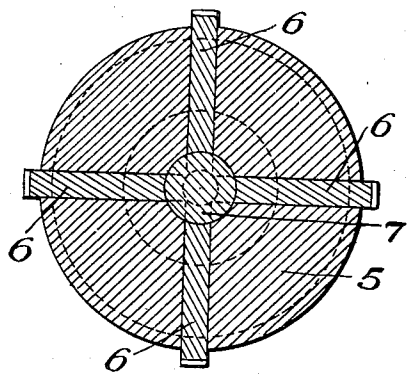


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 6.

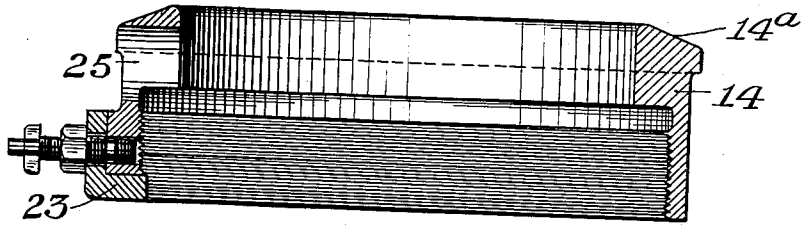


Fig. 7.

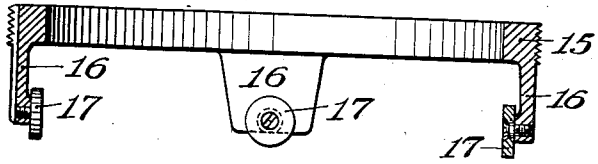
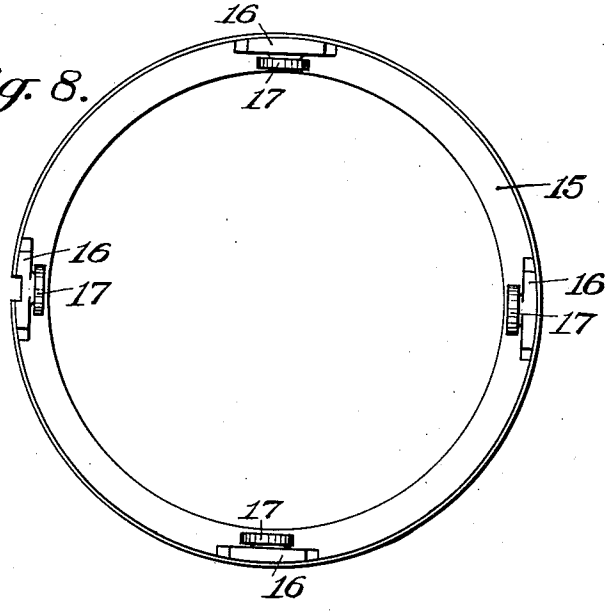


Fig. 8.



Witnesses

Walter L. Klemans

Richard Townsend

Inventor

Charles E. Gross jr.

by William B. Wharton

his attorney

UNITED STATES PATENT OFFICE.

CHARLES E. GROSS, JR., OF PITTSBURGH, PENNSYLVANIA.

AUTOMATIC TAP.

1,308,902. Specification of Letters Patent. Patented July 8, 1919.

Application filed November 26, 1917. Serial No. 203,884.

To all whom it may concern:

Be it known that I, CHARLES E. GROSS, Jr., a citizen of the United States, and resident of Pittsburgh, county of Allegheny, State of Pennsylvania, have invented a new and useful Improvement in Automatic Taps, of which the following is a specification.

This invention relates to an automatic tap.

The general object of the invention is to provide a tap for screw-threading pipe sockets or other blanks of similar nature in which the cutters of the cutting head are automatically expanded for operating on the socket, and are automatically contracted for withdrawal therefrom, this action being primarily produced by the movement of the spindle of the tapping machine to which the tap is applied. More specific objects of the invention are to provide a self-contained tap which may be applied to any usual form of tapping machine, which is positive in its operation, and in which means carried by the tap itself are provided for regulating the length to which the socket is tapped and the depth to which the threads are cut. A further object of the invention is to provide a tap having the advantages above enumerated which is simple in construction and comprises a relatively small number of parts.

In the accompanying drawings, Figure 1 is a view partly in elevation and partly in central vertical section showing the tap with the cutters of the cutting head in extended or operative position; Fig. 2 is a similar view showing the position of the parts upon completion of the tapping operation and contraction of the cutters for withdrawal of the cutting head from the socket being operated upon; Fig. 3 is a cross sectional view on the line 3—3 Fig. 1; Fig. 4 is a cross sectional view on the line 4—4 Fig. 1; Fig. 5 is a cross sectional view on the line 5—5 Fig. 1; Fig. 6 is a sectional detail view of the knock-off ring of the tap; Fig. 7 is a sectional detail view of the gage or tripping ring of the tap; and Fig. 8 is a bottom plan view of the gage ring.

The tap is secured to the spindle of any machine of standard design by engaging the flange plate 2 of the tap with the companion flange plate 3 rigidly secured to the spindle 1 of the machine. Rigidly secured to the flange plate 2 is a hollow tap shank, or stem, 4, having at its lower extremity the cutting head 5, which is provided with a plurality of expansible cutters 6. Within the hollow stem 4 of the tap is located the expanding rod or mandrel 7 for forcing the cutters 6 into their outward or operative position.

The mandrel 7 is secured to the hook plate 8 of a keeper, slidably surrounding the stem 4, by means of a transversely disposed pin 9, passing through the plate and mandrel and lying within the slot 10 in the stem. The hook plate 8 carries a plurality of pivoted hooks or dogs 11 arranged to engage the rim 12 of the adjusting ring 13, which is screw-threaded to the stem 4. Surrounding the adjusting ring 13, and slidable thereon to a limited extent, is the knock-off ring 14 having screw-threaded thereto the gage or tripping ring 15, the latter being provided with a plurality of extending legs 16 carrying small rollers 17. Interposed between the hook plate 8 and the adjusting ring 13, is the coiled spring 18 which normally tends to force the keeper upwardly or rearwardly on the stem of the tap.

In operative position of the parts, the hooks 11 on the plate 8 engage the rim 12 of the adjusting ring, and hold the plate in its advanced position against the resistance of the coiled spring 15. In this position of the keeper the mandrel 7 is forced outwardly by means of the connecting pin 9, and its tapered forward portion enters into the cutting head 5 to expand the cutters 6. At the completion of the tapping operation, the downward or forward movement of the machine spindle 1 and the tap will cause the rollers 17 of the tripping ring to contact the upper edge of the socket 19 being operated upon, and continued movement will force the knock-off ring 14 upwardly or rearwardly, so that its beveled upper edge 14^a, in contact with the hooks 11, will force the latter from their position of engagement with the rim of the adjusting ring 13. The coiled spring 15 will thus be permitted to force the keeper upwardly or rearwardly and cause the mandrel 7 to be withdrawn from the cutting head, permitting the cutters 6 to collapse inwardly. The cutting head is then in position to be withdrawn directly from the socket without reverse rotation of the machine spindle or the tap, and is removed therefrom by the simple retraction of the spindle 1 of the machine.

A follower 20 slidably surrounds the stem

1 of the machine, and has a plurality of rods 21, passing through the flange plates 2 and 3, and bearing against the upper face of the hook plate 8. The retraction of the machine spindle and the tap causes the follower 20 to strike against a rigid stop 22 secured at a suitable point to the frame of the machine, so that the keeper, against which the rods 21 bear, is forced into proximity to the adjusting ring 13, with the rim 12 of which the dogs 11 will immediately engage to hold the plate 8 in advanced position. As will be readily understood, the mandrel 7 is thus advanced again to expand the cutters, and the parts are in position for the tapping of another socket.

The tripping ring 17, which is screw-threaded to the knock-off ring 14, is held against movement relative to the knock-off ring by means of a bolt 23 passing through the ring 14 and bearing against the ring 15. By loosening this bolt and rotating the tripping ring, the latter may be adjusted relatively to the knock-off ring 14 so that its legs extend a greater or lesser distance therebeyond. By this means the depth to which the socket is to be tapped may be accurately determined in advance.

The position of the adjusting ring 13 may also be so regulated that it will determine the extent to which the mandrel 7 will enter the cutting head 5, and thus determine the degree to which it will force the cutters 6 outwardly. The adjustment is made by rotating the adjusting ring 13 on the stem 4, to which it has a screw-threaded engagement, and it will be readily seen that this adjustment will regulate the extent of the movement of the keeper before it engages the adjusting ring, and will thus shorten or lengthen the movement of the mandrel 7, causing it to enter the cutting head to a greater or lesser extent. The adjusting ring 13 is normally held against movement on the stem 4 by means of a bolt 24 passing through a slot 25 in the knock-off ring and bearing against a locking piece 26.

The tap above described is designed peculiarly for use in vertical tapping machines for operating upon pipe sockets, and, as will be apparent, is so designed that the sockets may be conveniently tapped the desired distance from each extremity thereof. The tap is, however, completely self-contained, and can be readily applied to the spindle of either a horizontal or vertical tapping machine for operating upon any usual form of tubular blank. The tap not only contains in itself the means for expanding and contracting the cutters of the cutting head, but the means for adjusting the depth of the threads cut and the length to which the blank is tapped are also carried by the tap itself, and are without connection with the body of the machine to which the tap is applied.

It will be further observed that the mandrel or expanding rod of the tap is withdrawn from the cutting head by the continued movement, and not by the retraction, of the machine spindle, and that the spindle may continue to rotate after withdrawal of the mandrel without producing any effect upon the article which has been tapped. This fact renders the tap positive in its operation, and obviates any possibility of injury to the cutters or completed article through the withdrawal of the cutting head before the cutters thereon are allowed to completely collapse.

What I claim is:—

1. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, resilient means arranged to exert a force tending to withhold said expanding member from operative position, a movably mounted keeper rigidly connected to said expanding member and arranged to engage a portion of said tap and hold said expanding member against the resistance of said resilient means in position to expand said cutters, and a knock-off ring in said tap arranged to contact the engaging means of said keeper and having a ring adjustable thereon and arranged to contact the blank being tapped to cause said knock-off ring to release said keeper.

2. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, adjustable means on said stem for holding said member in position to expand said cutters to a predetermined extent, and adjustable tripping means in said tap arranged to release said expanding member on completion of the tapping operation.

3. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, resilient means arranged to exert a force tending to withhold said expanding member from operative position, means adjustable on said stem for holding said member in position to expand said cutters to a predetermined extent against the resistance of said resilient means, and adjustable tripping means in said tap arranged to release said expanding member on completion of the tapping operation.

4. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said

cutters, a movably mounted keeper rigidly connected to said expanding member and arranged to engage a member adjustable on said stem for holding said expanding member in position to expand said cutters to a predetermined extent, and a knock-off ring in said tap arranged to contact the engaging means of said keeper and having a ring adjustable thereon and arranged to contact the blank being tapped to cause said knock-off ring to release said keeper.

5. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, resilient means arranged to exert a force tending to withhold said expanding member from operative position, a movably mounted keeper rigidly secured to said expanding member and arranged to engage a member adjustable on said stem for holding said expanding member in position against the resistance of said resilient means to expand said cutters to a predetermined extent, and a knock-off ring in said tap arranged to contact the engaging means of said keeper and having a ring adjustable thereon and arranged to contact the blank being tapped to cause said knock-off ring to release said keeper.

6. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, a movably mounted keeper rigidly connected to said expanding member and arranged to engage a portion of said tap for holding said expanding member in position to expand said cutters, and means in said tap arranged to bring said expanding member and keeper into operative position upon retraction of the machine spindle.

7. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, a movably mounted keeper rigidly connected to said expanding member and arranged to engage a portion of said tap for holding said expanding member in position to expand said cutters, means in said tap arranged to bring said expanding member and keeper into operative position upon retraction of the machine spindle, and means in said tap for releasing and withdrawing said expanding member.

8. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, a movably mounted keeper rigidly connected to said expanding member and arranged to engage a portion of said tap, resilient means bearing against said keeper for withholding said keeper and expanding member from operative position, and a follower arranged to bear against said keeper and on retraction of the machine spindle to engage a suitably positioned stop for bringing said keeper and expanding member into operative position against the resistance of said resilient means.

9. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, a movably mounted keeper rigidly connected to said expanding member and arranged to engage a portion of said tap, resilient means bearing against said keeper for withholding said keeper and expanding member from operative position, a follower arranged to bear against said keeper and engage a suitably positioned stop on retraction of the machine spindle for bringing said keeper and expanding member into operative position against the resistance of said resilient means, and means in said tap arranged to contact the blank being tapped for releasing said keeper and expanding member.

10. A tap arranged to be applied to the spindle of a tapping machine, comprising a cutting head having expansible cutters, a member arranged to enter said cutting head and expand said cutters, adjustable means in said tap for holding said member in position to expand said cutters to a predetermined extent, means in said tap arranged to bring said expanding member into operative position upon retraction of the machine spindle, and means in said tap for releasing and withdrawing said expanding member.

11. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, resilient means arranged to exert a force tending to withhold said expanding member from operative position, means adjustable on said stem for holding said expanding member in position to expand said cutters to a predetermined extent, and means in said tap arranged to bring said expanding member into operative position upon retraction of the machine spindle.

12. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, resilient means arranged to exert a force tending to withhold said expanding member from operative position, means ad-

justable on said stem for holding said expanding member in position to expand said cutters to a predetermined extent, means in said tap arranged to bring said expanding member into operative position upon retraction of the machine spindle, and means in said tap arranged to contact the blank being tapped for releasing said expanding member.

13. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, resilient means arranged to exert a force tending to withhold said expanding member from operative position, means in said tap arranged to bring said expanding member into operative position upon retraction of the machine spindle, means in said tap arranged to hold said expanding member in operative position against the resistance of said resilient means, and tripping means adjustable relatively to said stem and arranged to release said expanding member on completion of the tapping operation.

14. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, resilient means arranged to exert a force tending to withhold said expanding member from operative position, a movably mounted keeper rigidly connected to said expanding member and arranged to engage a portion of said tap and hold said expanding member against the resistance of said resilient means, means in said tap arranged to bring said expanding member into operative position upon retraction of the machine spindle, and a knock-off ring in said tap arranged to contact the engaging means of said keeper and having a ring adjustable thereon and arranged to contact the blank being tapped to cause said knock-off ring to release said keeper.

15. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, a movably mounted keeper rigidly connected to said expanding member and arranged to engage a portion of said tap, resilient means bearing against said keeper for withholding said keeper and expanding member from operative position, a follower bearing against said keeper and arranged upon retraction of the machine spindle to engage a suitably positioned stop and bring said keeper and expanding member into operative position against the resistance of said resilient means, and means in said tap for releasing said expanding member.

16. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, resilient means arranged to exert a force tending to withhold said expanding member from operative position, a movably mounted keeper rigidly connected to said expanding member and arranged to engage a portion of said tap and hold said expanding member against the resistance of said resilient means in position to expand said cutters, a follower bearing against said keeper and arranged upon retraction of the machine spindle to engage a suitably positioned stop for bringing said keeper and expanding member into operative position, and a knock-off ring in said tap arranged to contact the engaging means of said keeper and having a ring thereon arranged to contact the blank being tapped to cause said knock-off ring to release said keeper.

17. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, adjustable means on said stem for holding said expanding member in position to expand said cutters to a predetermined extent, means arranged to bring the parts into operative position upon retraction of the machine spindle, and adjustable tripping means in said tap arranged to release said expanding member on completion of the tapping operation.

18. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, resilient means arranged to exert a force tending to withhold said expanding means from operative position, means adjustable on said stem for holding said member in position to expand said cutters to a predetermined extent against the resistance of said resilient means, means arranged to bring the parts into operative position upon retraction of the machine spindle, and adjustable tripping means in said tap arranged to release said expanding member on completion of the tapping operation.

19. A tap arranged to be applied to the spindle of a tapping machine, comprising a stem, a cutting head having expansible cutters on said stem, a member arranged to enter said cutting head and expand said cutters, a movably mounted keeper rigidly connected to said expanding member and arranged to engage a member adjustable on said stem for holding said expanding member in position to expand said cutters to a predetermined extent, a follower bearing

against said keeper and arranged upon retraction of the machine spindle to engage a suitably positioned stop and bring said keeper and expanding member into operative position, and a knock-off ring in said tap arranged to contact the engaging means of said keeper and having a ring adjustable thereon and arranged to contact the blank being tapped to cause said knock-off ring to release said keeper.

In witness whereof I have hereunto set my hand.

CHARLES E. GROSS, JR.

Witnesses:

WALTER S. KLEMANS,

SUE B. FRITZ.