April 16, 1935. G. W. EMRICK 1,998,275

MULTIPLE TAPPING DEVICE

Filed June 18, 1934 2 Sheets-Sheet 1

Fig. 1

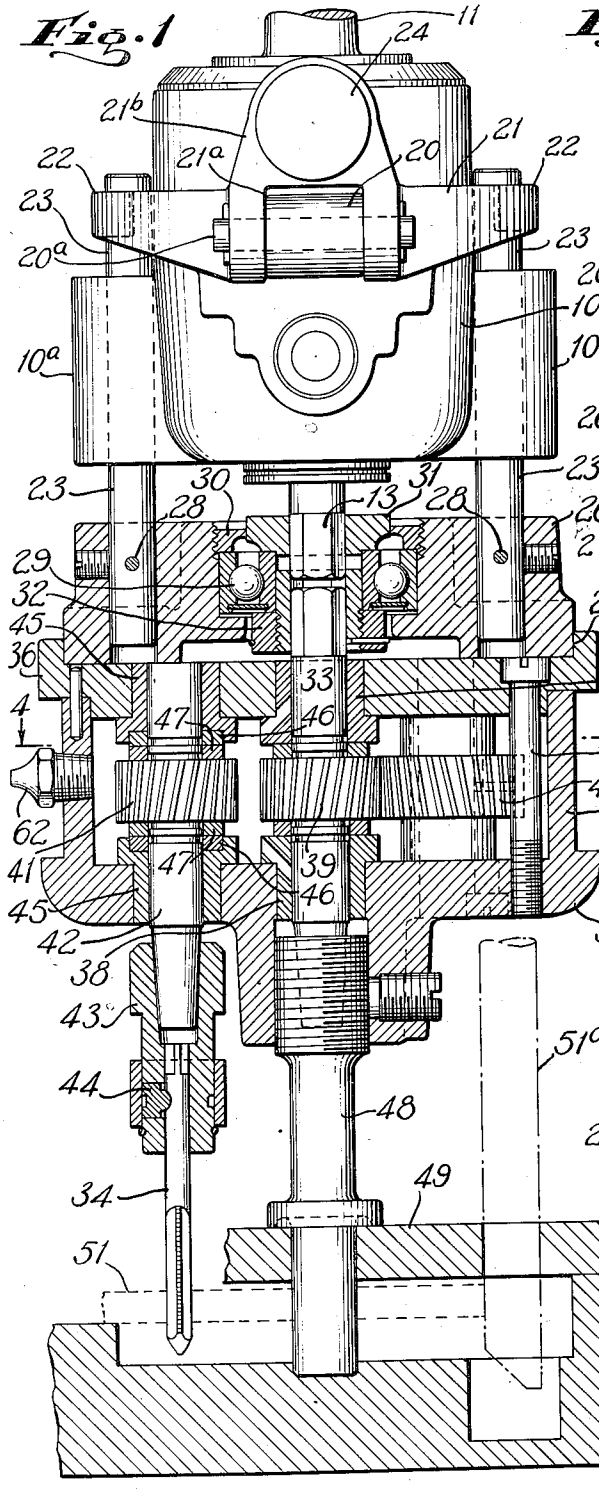


Fig. 2

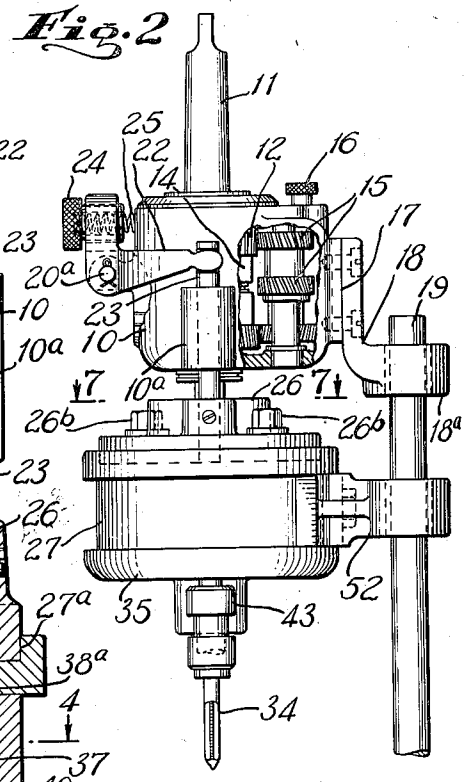
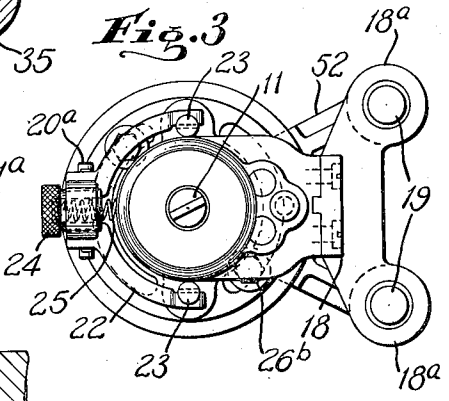


Fig. 3



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Fig. 4

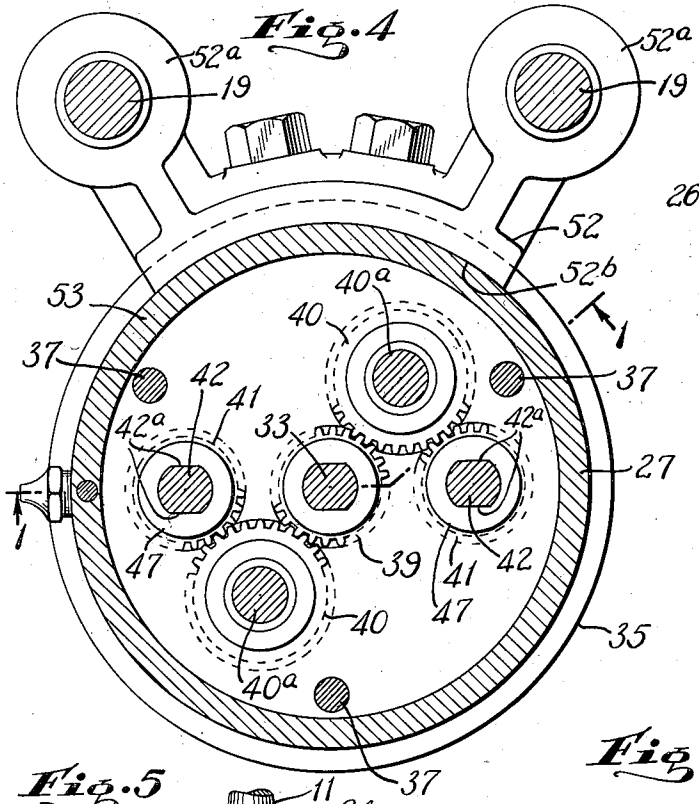


Fig. 7

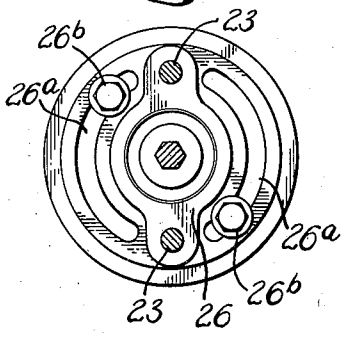


Fig. 5

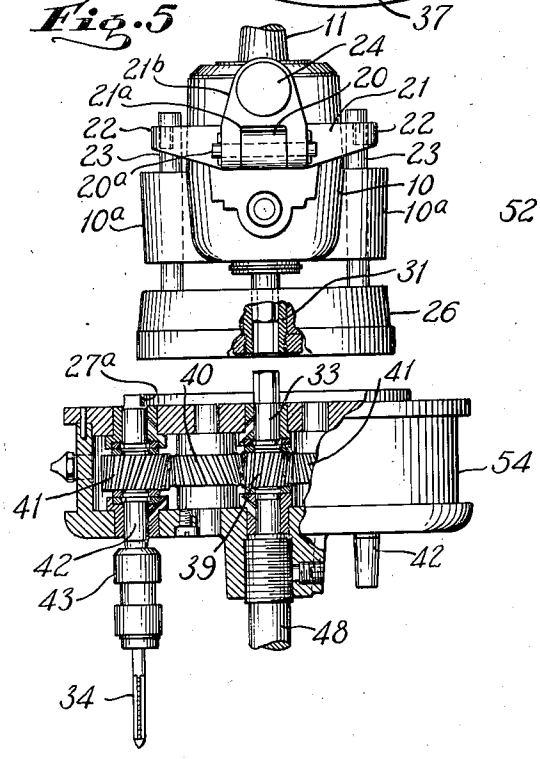
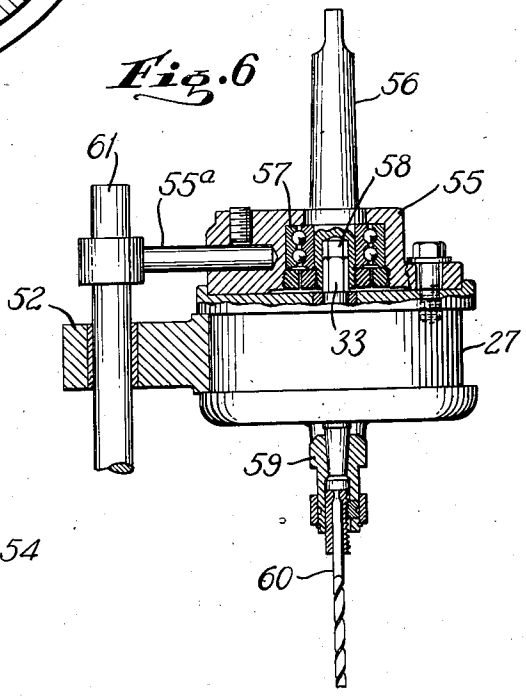


Fig. 6



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MULTIPLE TAPPING DEVICE

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Application June 18, 1934, Serial No. 731,091

18 Claims. (Cl. 10—129)

This invention relates to multiple tapping devices and particularly to devices of this class employing means whereby various sizes and arrangements of gear cases may be used in conjunction with a single attachment; and the object of the invention is to provide a tapping attachment with a coupling plate of standard size and wherein gear cases of different sizes and arrangements may be coupled therewith so that a single tapping attachment may be adapted to many uses in multiple tapping work; a further object being to provide yieldable means for supporting the gear case and coupling plate in connection with the attachment; a further object being to provide means for coupling guide blocks in connection with the gear case including work locating or alinement rods; a still further object being to provide means for adapting the gear cases as multiple drilling attachments to provide two distinct uses thereof; a still further object being to provide a complete unit attachment of the class described wherein the several parts are interchangeable in the construction of the gear cases, whereby in laying out a case of specific design, gears, spindles and the like of stock sizes may be employed in constructing or assembling the case, thus materially reducing the production cost thereof, and in all cases, the tapping attachment, which by the way may be made in three or more sizes, will in so far as each size is concerned be usable in conjunction with numerous arrangements of gear cases, thus eliminating the necessity of purchasing or constructing separate tapping attachments as has been the practice heretofore; and with these and other objects in view, the invention consists in a device of the class and for the purpose specified which is simple in construction, efficient in use and which is constructed as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which:

Fig. 1 is a side and sectional view of a complete multiple tapping device diagrammatically indicating the method of its use, the sectional portion being on the broken line 1—1 of Fig. 4.

Fig. 2 is a side view taken at right angles to that shown in Fig. 1 on a reduced scale and with part of the construction broken away and in section,

Fig. 3 is a plan view of the structure shown in Fig. 2.

Fig. 4 is a partial section on the line 4—4 of Fig. 1.

Fig. 5 is a view similar to Fig. 1 showing the parts in separated position and showing a modification.

Fig. 6 is a side and sectional view showing a gear case or hood applied to the modified use; and,

Fig. 7 is a partial section on the line 7—7 of Fig. 2.

In the drawings 10 represents the casing of a tapping attachment, the drive mechanism of which forms the subject matter of a prior application filed by me May 17, 1934 and bearing Serial Number 726,107, which mechanism involves a tapered shank 11 actuating a drive gear 12 disposed within the casing for directly driving a projecting hexagon or angular shank 13 through a suitable friction drive 14 or to operate the shank 13 in a reverse direction through a reverse drive gear chain indicated at 15. The drive mechanism of the casing 10 operates in a bath of oil which is introduced into the casing through a suitable oil admission plug 16 so as to adapt the attachment to high speed work.

The casing shown in my prior application is modified to the end of providing a relatively flat plate portion 17 thereon to provide for the attachment of a guide bracket or other supporting member 18, the bracket 18 having a pair of cylindrical bearings 18a for receiving guide rods 19 as clearly seen in Figs. 2 and 3 of the drawings.

The opposed side wall of the casing has an outwardly projecting lug 20 in connection with which is pivoted an adjustment and supporting yoke 21, the free ends of the side arms 22 of which are adapted to enter recesses in supporting and guiding rods 23. The crosshead of the yoke 21 is recessed as seen at 21a to receive the projecting lug 20, and a pin 20a extends through the lug and the crosshead to pivotally support the yoke in connection with the casing, the crosshead of said yoke having an upwardly directed lug 21b in which is mounted a spring adjustment screw 24 operating upon a spring 25 to balance or yieldably support a coupling plate 26 as well as a gear case or head 27 including the parts thereof or coupled therewith in connection with the casing 10. The casing 10 also has projecting side lugs 10a through which the supporting and guide rods 23 pass.

The coupling plate 26 becomes a standard fixture of the tapping attachment, the gear cases or

heads 27 regardless of their difference in design, size or contour being all made to fit the standard plate, at least in the several sizes of attachments employed, it being understood at this time that the tapping attachment involving the casing 10 and/or parts thereof may be made in three or more sizes adapting the same to light, heavy or extremely heavy work. The bars 23 enter apertures in the plate 26 and after adjusting the plate to a desired position and alinement with respect to the casing, the bars are definitely secured to the plate by pins or other means 28.

Arranged centrally of the plate 26 is a ball bearing 29, the outer race of which is held in place by a lock screw 30. Arranged within the inner race of the ball bearing is a drive sleeve 31 held in place by a nut 32, the bore of the sleeve 31 being hexagon or angular in form to receive the angular drive spindle 13 as well as the projecting angular portion of the driven spindle 33 of the gear case 27. The lower surface of the coupling plate 26 seats in a recess 27*a* formed in the upper part of the case and the plate 26 is provided with a plurality of circumferentially elongated apertures 26*a*, note Fig. 7, through which bolts 26*b* are passed to adjustably couple the gear case 27 with respect to the plate so as to properly aline or position the tapping tools 34 with respect to the workpiece, as will be apparent.

The gear case or head 27 consists of a casing proper 35 and a cover plate 36 secured thereto by bolts or screws 37. The shaft or spindle 33 is mounted in suitable bushings 38 in the casing 35, and 38*a* in the cover 36. Keyed to the spindle is a drive gear 39 adapted to mesh with idler gears 40, which in turn mesh with gears 41 on the different driven spindles 42, any number of which may be employed, and two of which are shown in the accompanying drawings. The free ends of the spindles 42 project below the lower surface of the casing 35 and are tapered to receive chuck casings 43 having a drive fit thereon, the chuck casing having means indicated at 44 for securing the taps 34 in connection therewith. My invention is not limited to any particular type or kind of chuck employed as any conventional type of chuck may be employed for this purpose.

Each of the driven spindles 42 is mounted in bushings 45 in the casing 35 and cover 36 and bearing washers or disks 46 are pressed into the inner surfaces of said bushings and operate upon similar washers or rings 47 disposed adjacent the groove 41 and keyed to the spindles by the flattened surfaces provided on said spindles as indicated at 42*a* in Fig. 4 of the drawings. Secured centrally to the lower portion of the casing 35 is an adjustable depth stop, guide or workpiece locator 48 operating in conjunction with a plate or guide 49 secured to the base or fixture 50 in conjuction with which the workpiece indicated at 51 is supported.

I also may employ workpiece supporting or locating rods 51*a* such as indicated in dot and dash lines in Fig. 1 of the drawings to aid in locating or centering the workpiece 51 with respect to the taps 34, which rods 51*a* will be supported in connection with the gear case or head 27 in the manner of supporting guide blocks 52 thereon, the latter having two cylindrical bearings 52*a* for receiving the guide rods 19 in order to guide the case 27 in conjunction with the attachment casing 10 in the upward and downward movement of the complete unit in performing tapping operations.

The block 52 has an arc-shaped portion 52*b* seating in an annular groove or recess 53 formed on the outer surface of the gear case 27 and between a lower outwardly flanged portion of the casing 35 thereof and the cover 36.

At this time it will be understood that the position of the driven spindles 42 radially and circumferentially with respect to the drive spindle 33 of the gear case 27 will vary in many instances, and it is proposed that stock sizes of gears or pinions will be employed so as to readily construct gear cases to suit various types of work, the only requirement being to construct a special casing 35 and cover plate 36 therefor in conjunction with which the stock sizes of gears and spindles may be employed, which also includes the spindles or stub shafts 40*a* for the idler gears 40 which are incorporated. In this way, a large variety of gear cases or heads may be used in conjunction with a single tapping attachment, each case or head having a recess 27*a* to fit the standard or fixed size of coupling plate 26 employed.

In order to illustrate one modified use of the invention, I have indicated in Fig. 5 of the drawings, a gear case or head 54 which is larger in diameter than the case 27. Aside from the fact that the gears or pinions will be of a larger size, the structure of the case 55 in so far as elements are concerned, is the same as the case 27 and like references will indicate like parts in the respective illustrations. At this time, it is also important to note that the drive spindles 33 of the gear cases or heads employed will have angular shanks adapted to enter the angular bores of the drive sleeves 31, which are clearly illustrated by the separation of the case 54 from the plate 26 in Fig. 5 of the drawings.

In Fig. 6 of the drawings, I have shown a modified use of my invention wherein a gear case or head 27 similar to the head 27 shown in Fig. 1 of the drawings is attached to a standard adaptor plate or coupling 55 in which is rotatably mounted a tapered drive shank 56 for attachment with a drill press or the like, the shank operating in a double roller bearing construction 57 in the plate 55 and having an angular socket portion 58 for receiving the angular portion of the drive spindle 33 of the gear case. With this construction, the driven spindles 42 receive chucks 59 for coupling drills 60 therewith, and the plate 55 will have a projecting guide member 55*a* for engaging a guide rod or rods 61 on which the case 27 is also guided by the block 52 similar to that shown in Figs. 2 and 3 of the drawings.

From the foregoing it will appear that in addition to using the gear cases or heads simply for the purpose of driving tapping tools, the same may also be used to first drill holes prior to the tapping thereof without any structural change in the gear case or head, but simply by providing suitable chucks on the driven spindles 42 for coupling taps and drills therewith. It will thus be seen that in this use of the invention, coupling plates 55 of standard sizes corresponding to the sizes of the coupling plates 26 may be employed for the respective gear cases or heads employed to produce both multiple drilling and tapping operations on respective workpieces.

In operation, it will be apparent that in the forward drive of the driven spindle 13 of the tapping attachment, the several taps 34 of the gear case or tapered head will be driven in a forward direction through the gears 33, 40 and 41 employed therein, and in the reverse drive of the spindle 13, a corresponding reverse rotation will

be imparted to the taps **34**. In both of these operations, it will be apparent that the entire unit will first move downwardly with respect to the work in tapping the holes and then upwardly during the reverse drive, the unit being guided on the rods **19** or other guiding means employed. In both of these operations, the spring **25** which acts as a means for counterbalancing the weight of the gear case **27** and coupling plate **26**, will permit independent movement of said plate and case with respect to the casing **10** of the tapping attachment should the tools be subjected to the stress or strain in their downward and upward movements.

The casing **35** is provided with a grease admission cup **62** whereby a light grease may be introduced into the chamber of the gear case to thoroughly lubricate the gears as well as the bearings provided therein and the spindles employed, so as to facilitate the use of the multiple unit for high speed work.

My improved multiple tapping device or unit, by virtue of the standardization of the majority of the parts thereof will provide a shop accustomed to producing various types of multiple tappings in workpieces with a simple and economical means for carrying out such wide range and variations in work to be produced at a great saving in time and expense in equipment, thus enabling the shop to produce work of this type more economically by materially reducing the tool or fixture costs.

While limited uses of the invention are herein illustrated, the same will be applicable to unlimited uses and various changes in and modifications of the construction herein described may be made within the scope of the appended claims.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In multiple tappers of the class described, a tapping attachment having a forward and reverse driven spindle projecting therefrom with means for actuating said spindle in forward and reverse directions, and a coupling plate including a driven member keyed to the driven spindle of said attachment and having a standard socket portion in connection with which a member to be driven is adapted to be coupled independent of the driven spindle.

2. In multiple tappers of the class described, a tapping attachment having a forward and reverse driven spindle projecting therefrom with means for actuating said spindle in forward and reverse directions, and a coupling plate including a driven member keyed to the driven spindle of said attachment and having a standard socket portion in connection with which members to be driven are adapted to be coupled, and means for yieldably and adjustably supporting said plate in connection with the casing of said attachment.

3. The combination with a tapping attachment of the class described having a driven member, of a multiple tool head having a drive member, and means including a coupling plate of standard size for coupling heads of varying characteristics with the tapping attachment, said coupling plate including means for placing the driven member of the attachment in operative engagement with the drive member of said head, and said means comprising a coupling sleeve rotatably mounted on the plate and having an angular socket for receiving angular ends of said drive and driven members.

4. The combination with a tapping attachment of the class described having a driven member, of a multiple tool head having a drive member, and means including a coupling plate of standard size for coupling heads of varying characteristics with the tapping attachment, said coupling plate including means for placing the driven member of the attachment in operative engagement with the drive member of said head, and means comprising a yoke-shaped member pivotally supported in connection with the attachment and rods in operative engagement with the ends of said yoke-shaped member for yieldably supporting the plate and head in connection with said attachment.

5. In multiple tappers of the class described, a tapping attachment having a forward and reverse driven spindle projecting therefrom with means for actuating said spindle in forward and reverse directions, a coupling plate including a driven member keyed to the driven spindle of said attachment and having a standard socket portion in connection with which members to be driven are adapted to be coupled, a multiple head for attachment to said coupling plate, said head having a plurality of driven tool supporting spindles, and means including a drive spindle engaging the socket portion of said coupling plate for operating said tool supporting spindles by the forward and reverse driven spindle of said attachment.

6. In multiple tappers of the class described, a tapping attachment having a forward and reverse driven spindle projecting therefrom with means for actuating said spindle in forward and reverse directions, a coupling plate including a driven member keyed to the driven spindle of said attachment and having a standard socket portion in connection with which members to be driven are adapted to be coupled, a multiple head for attachment to said coupling plate, said head having a plurality of driven tool supporting spindles, means including a drive spindle engaging the socket portion of said coupling plate for operating said tool supporting spindles by the forward and reverse driven spindle of said attachment, and means for adjustably coupling the multiple head with said plate.

7. In multiple tappers of the class described, a tapping attachment having a forward and reverse driven spindle projecting therefrom with means for actuating said spindle in forward and reverse directions, a coupling plate including a driven member keyed to the driven spindle of said attachment and having a standard socket portion in connection with which members to be driven are adapted to be coupled, a multiple head for attachment to said coupling plate, said head having a plurality of driven tool supporting spindles, means including a drive spindle engaging the socket portion of said coupling plate for operating said tool supporting spindles by the forward and reverse driven spindle of said attachment, means for adjustably coupling the multiple head with said plate, and means on the head and attachment for guiding the movement thereof toward and from a workpiece.

8. In multiple tappers of the class described, a tapping attachment having a forward and reverse driven spindle projecting therefrom with means for actuating said spindle in forward and reverse directions, a coupling plate including a driven member keyed to the driven spindle of said attachment and having a standard socket portion in connection with which members to be driven are adapted to be coupled, a multiple head for attachment to said coupling plate, said head hav-

ing a plurality of driven tool supporting spindles, means including a drive spindle engaging the socket portion of said coupling plate for operating said tool supporting spindles by the forward and reverse driven spindle of said attachment, means for adjustably coupling the multiple head with said plate, means on the head and attachment for guiding the movement thereof toward and from a workpiece, and means for adjustably and yieldably supporting the head and plate in connection with said attachment.

9. A tapping attachment of the class described comprising a casing, a drive shank projecting from said casing, a driven spindle projecting from said casing, means within the casing for rotating the driven spindle by said shank in forward and reverse directions, a yoke-shaped supporting member pivoted to one side of the casing and partially encircling the same, means for suspending a tool operating head in connection with said yoke-shaped member and a spring cooperating with said member to yieldably support the head in connection with the casing of said attachment.

10. The combination with a tapping attachment of the class described having a driven member, of a multiple tapping head having a drive member, and means including a coupling plate of standard size for detachably coupling tapping heads of varying characteristics with the tapping attachment, and the coupling plate including means rotatable in said plate and to which said driven member and drive member are separately keyed for placing the driven member of the attachment in operative engagement with the drive member of said head.

11. The combination with a tapping attachment of the class described having a driven member, of a multiple tapping head having a drive member, and means including a coupling plate of standard size for detachably coupling tapping heads of varying characteristics with the tapping attachment, the coupling plate including means rotatable in said plate and to which said driven member and drive member are separately keyed for placing the driven member of the attachment in operative engagement with the drive member of said head, and means for adjustably coupling the head with said plate.

12. The combination with a tapping attachment of the class described having a driven member, of a multiple tapping head having a drive member, and means including a coupling plate of standard size for detachably coupling tapping heads of varying characteristics with the tapping attachment, the coupling plate including means rotatable in said plate and to which said driven member and drive member are separately keyed for placing the driven member of the attachment in operative engagement with the drive member of said head, means for adjustably coupling the head with said plate, and means for yieldably supporting the head and plate in conjunction with said tapping attachment.

13. In multiple tool operating devices of the class described, a multiple tool head comprising a drive spindle and a plurality of driven spindles in operative engagement with the drive spindle and with which tools are adapted to be coupled, a coupling plate of predetermined size for coupling said head with an operating unit, and means including a large socket portion on said head for receiving said plate, and an angular portion on the drive spindle extending into said socket portion for coupling said head and spindle with said plate.

14. In multiple tool operating devices of the class described, a multiple tool head comprising a drive spindle and a plurality of driven spindles in operative engagement with the drive spindle and with which tools are adapted to be coupled, a coupling plate of predetermined size for coupling said head with an operating unit, means including a large socket portion on said head for receiving said plate, an angular portion on the drive spindle extending into said socket portion for coupling said head and spindle with said plate, and guide members coupled and movable with said head for guiding the same in its movement with respect to a workpiece.

15. In multiple tool operating devices of the class described, a multiple tool head comprising a drive spindle and a plurality of driven spindles in operative engagement with the drive spindle and with which tools are adapted to be coupled, a coupling plate of predetermined size for coupling said head with an operating unit, means including a large socket portion on said head for receiving said plate, an angular portion on the drive spindle extending into said socket portion for coupling said head and spindle with said plate, and workpiece guiding and alinement means on said head for alining a workpiece with respect to the axis of the driven spindles of said head.

16. In multiple tool operating devices of the class described, means including a plate of standard size for coupling multiple tool heads of varying characteristics with a drive unit, an angular sleeve socket centrally of the plate, a ball bearing in said plate to provide free rotation of the sleeve socket therein, and said sleeve socket providing a coupling between independent angular spindles of the multiple tool head and driving unit.

17. In multiple tool operating devices of the class described, means including a plate of standard size for coupling multiple tool heads of varying characteristics with a drive unit, an angular sleeve socket centrally of the plate, a ball bearing in said plate to provide free rotation of the sleeve socket therein, said sleeve socket providing a coupling between independent angular spindles of the multiple tool head and driving unit, and means providing rotary adjustment and coupling of the plate with said head.

18. In multiple tool operating devices of the class described, means including a plate of standard size for coupling multiple tool heads of varying characteristics with a drive unit, an angular sleeve socket centrally of the plate, a ball bearing in said plate to provide free rotation of the sleeve socket therein, said sleeve socket providing a coupling between independent angular spindles of the multiple tool head and driving unit, means providing rotary adjustment and coupling of the plate with said head, and means for yieldably supporting the plate in connection with said driving unit.

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