F. J. LAPOINTE.

ATTACHMENT FOR BROACHING MACHINES.

APPLICATION FILED FEB. 2, 1921.

1,421,014. Patented June 27, 1922.

2 SHEETS—SHEET 1.

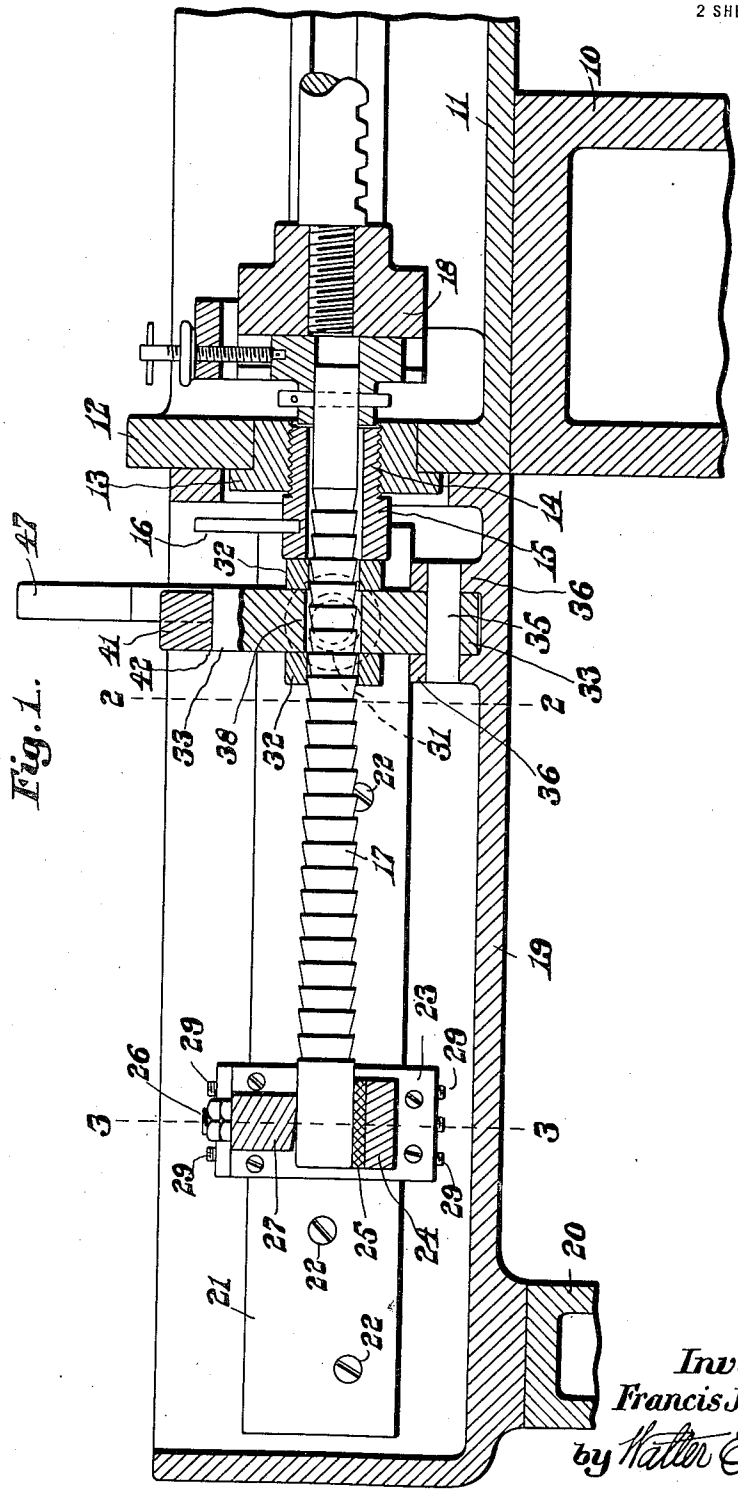


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

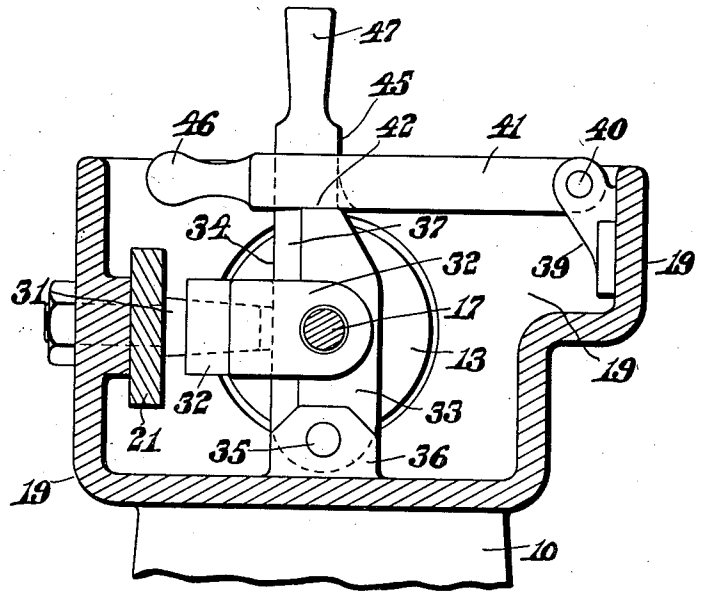


Fig. 3.

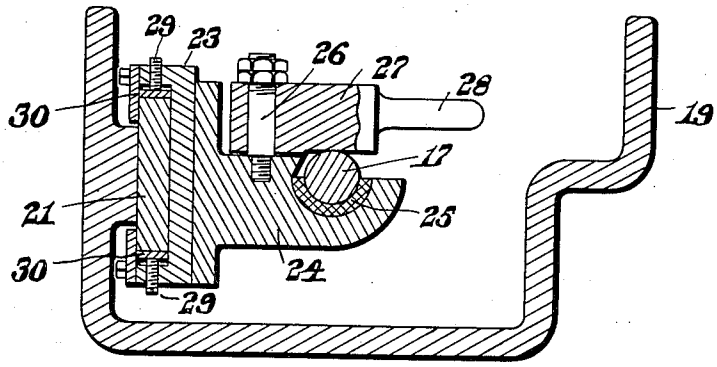
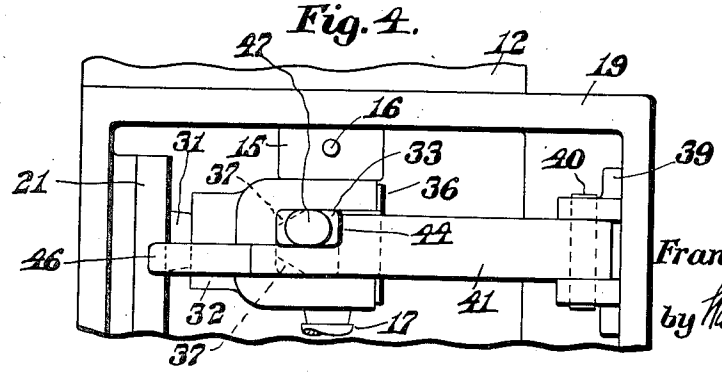


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ATTACHMENT FOR BROACHING MACHINES.

1,421,014. Specification of Letters Patent. Patented June 27, 1922.

Application filed February 2, 1921. Serial No. 441,922.

To all whom it may concern:

Be it known that I, FRANCIS J. LAPOINTE, a citizen of the United States of America, and a resident of Ann Arbor, in the county of Washtenaw and State of Michigan, have invented certain new and useful Improvements in Attachments for Broaching Machines, of which the following is a specification.

This invention relates to broaching machines and has for its object the provision of a machine of this character particularly adapted to form alined holes in bifurcated members such for instance as the two parts of a universal joint.

The invention consists primarily in a novel work-supporting device which retains the work in rigid position during the operation of the broaching tool.

The invention further consists in a novel back stop to take the strain off of the work while the broaching tool is being pulled through said work.

The invention further consists in a novel means of supporting the outer end of the broaching tool.

The invention also consists in certain novel features of construction and arrangement of parts which will be understood readily by reference to the description of the drawings and to the claims to be hereinafter given.

For the purpose of illustrating the invention, one preferred form thereof is illustrated in the drawings, this form having been found to give satisfactory and reliable results although it is to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized and the invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described except as required by the scope of the appended claims.

Of the drawings:

Figure 1 represents a vertical section of a portion of a broaching machine embodying the principles of the present invention.

Figure 2 represents a transverse section of the same on line 2, 2, on Fig. 1.

Figure 3 represents a transverse section of the same on line 3, 3, on Fig. 1, and

Figure 4 represents a plan of the work-locking device.

Similar characters indicate like parts throughout the several figures of the drawings.

In the drawings, 10 is a portion of a base having mounted thereon a framework 11 provided with an end wall 12.

In the end wall 12 is removably mounted an annular flanged member 13 to which is threaded a shank 14 of a bushing 15 provided with a handle 16.

This handle 16 may be used to turn the bushing 15 about its axis and thereby cause said bushing to be moved endwise.

The bushing 15 has a cylindrical hole extending axially thereof through which the broaching tool 17 is adapted to pass.

One end of the broaching tool 17 is secured to the movable carriage 18 adapted to be reciprocated in any well known manner longitudinally of the framework 11.

As the operating elements of the broaching machine form no part of the present invention, it is believed to be unnecessary to show and describe the same in detail.

To the outer end of the wall 12 is secured a trough extension 19, the outer end of which is supported on a pedestal 20.

To one inner wall of the trough extension 19 is secured a bar 21 by means of the screws 22.

Mounted on the bar 21 and movable lengthwise thereof is the slide 23.

This slide 23 has secured to its inner face a bracket 24 having a semi-cylindrical seat 25 formed therein in which the free end of the broaching tool 17 is adapted to rest.

The bracket 24 has threaded thereto a vertical stud 26 on which is mounted a clamping member 27 having a handle 28 extending therefrom.

When the broaching tool has been mounted in the work to be operated upon and secured to the carriage 18, the slide 23 is clamped to the free end of the broaching tool by means of the clamping member 27 so that as the carriage 18 is reciprocated the slide 23 will be reciprocated also longitudinally of the supporting bar 21.

This slide 23 is provided with adjusting screws 29 and bearing plates 30 by which a limited vertical adjustment may be imparted to the slide 23 in order to bring the center of the seat 25 in axial alinement with the center of the bushing 15.

The bar 21 is provided with a tapered stud 31 adapted to support the work to be operated upon.

This stud 31 may be formed integral with the bar 21 or secured thereto and said tapered stud is perpendicular to the path of movement of the broaching tool 17.

The particular attachment to the broaching machine herein shown and described, is for the purpose of forming alined holes in bifurcated or slotted members such as the yokes of a universal joint.

When it is desired to operate upon a slotted member or yoke such as shown in the drawings at 32, the yoke is mounted upon the tapered stud 31 and then the pivoted member 33 is moved into position between the arms of the yoke until the wall 34 thereof comes into contact with the inner wall of the slot formed between the arms of said yoke or other piece of work.

This member 33 is pivoted at 35 to ears 36 extending upwardly from the bottom of the trough extension 19.

Portions 37 of the side walls of the pivoted member 33 nearest the supporting stud 31 are inclined inwardly toward each other as indicated in full lines in Fig. 2 and in dotted lines in Fig. 4.

The member 33 has a cylindrical opening 38 extending therethrough through which the broaching tool is adapted to pass during the broaching operation, this broaching tool being positioned and secured to the carriage 18 after the work has been mounted upon the stud 31 and the member 33 has been positioned as previously described.

To one inner wall of the trough extension 19 is secured a bracket 39 having ears extending upwardly therefrom to which is pivoted, at 40, a locking arm 41.

This arm when in locking position, rests upon a shoulder 42 formed upon the member 33 and said arm is provided with a shoulder 44 which engages the wall 45 to prevent movement of the member 33 about its pivot 35 during the broaching operation.

The arm 41 is provided with a handle 46 and the member 33 is provided with an actuating handle 47 as shown in the drawings.

The body portion of the member 33 is made of a width to approximately fit between the arms of the bifurcated piece of work to be operated upon and when positioned between the arms before the broaching tool is moved endwise, the bushing 15 is moved endwise against the outer face of one of the arms of the piece of work thus preventing any chattering during the broaching operation.

The bushing also forms an anvil or back stop for the work 32 as the broaching tool 17 is being pulled therethrough, taking all of the strain and removing all strain from the work-supporting stud 31.

While only one form of work is shown in the drawings being operated upon, it is obvious that various forms and shapes of work may be operated upon and mounted upon the supporting stud 31 by providing suitable adaptors.

The slide 23 may be quickly adjusted vertically to cause the center of the seat thereof to be in alinement with the axis of the supporting stud 31 thereby providing a means whereby very accurate work may be obtained as the holes in the bifurcated piece of work or yoke 32 will be broached in alinement and in the same plane with the axis of the tapered hole of said piece of work in which the supporting stud 31 is inserted.

It is believed that the operation and many advantages of the invention will be fully understood without further description.

Having thus described my invention, I claim:

1. The combination with a reciprocating broach-supporting carriage having a broaching tool; a bushing through which said tool is adapted to reciprocate; a work support perpendicular to the path of movement of said tool; and means for adjusting said bushing endwise to clamp the work to said support.

2. The combination with a reciprocating broach-supporting carriage having a broaching tool; a frame having a transverse wall; a bushing threaded to said wall and through which said tool is adapted to reciprocate; a work support perpendicular to the path of movement of said tool; and a handle for turning said bushing about its axis and thereby adjusting it endwise.

3. The combination with a reciprocating carriage having a broaching tool; a work support perpendicular to the path of movement of said tool and adapted to receive a bifurcated piece of work; and a member fitting between the arms of said work and having an opening therethrough for the passage of said tool.

4. The combination with a reciprocating carriage having a broaching tool; a work support perpendicular to the path of movement of said tool and adapted to receive a bifurcated piece of work; a member fitting between the arms of said work and having an opening therethrough for the passage of said tool; and means for locking said member in working position.

5. The combination with a reciprocating carriage having a broaching tool; a work support perpendicular to the path of movement of said tool and adapted to receive a bifurcated piece of work; a member movable into position between the arms of the work; and means for retaining said member between said arms during the broaching operation.

6. The combination with a reciprocating

carriage having a broaching tool; a work support perpendicular to the path of movement of said tool and adapted to receive a bifurcated piece of work; a member movable into position between the arms of the work; and provided with an opening for the passage of the tool; and means for retaining said member between said arms during the broaching operation.

7. The combination with a reciprocating broach-supporting carriage having a broaching tool; a work support perpendicular to the path of movement of said tool and adapted to receive a bifurcated piece of work; a pivoted member adapted to be moved about its pivot into position between the arms of the work; and means for retaining said member between said arms during the broaching operation.

8. The combination with a reciprocating broach-supporting carriage having a broaching tool; a work support perpendicular to the path of movement of said tool and adapted to receive a slotted piece of work; a pivoted member movable about its pivot into the slot; and means for preventing the displacement of said member during the broaching operation.

9. The combination with a reciprocating broach-supporting carriage having a broaching tool; a work support perpendicular to the path of movement of said tool and adapted to receive a slotted piece of work; a pivoted member movable about its pivot into the slot; and a pivoted arm adapted to engage said member and prevent its displacement.

10. The combination with a reciprocating broach-supporting carriage having a broaching tool; a work support perpendicular to the path of movement of said tool and adapted to receive a slotted piece of work; a pivoted member movable about its pivot into the slot; and a pivoted arm having a shoulder adapted to engage said member and prevent its displacement.

11. The combination with a reciprocating broach-supporting carriage having a broaching tool; a work support perpendicular to the path of movement of said tool and adapted to receive a slotted piece of work; a pivoted member movable about its pivot into the slot and having its sides nearest the work support inclined toward each other; and means for preventing the displacement of said member during the broaching operation.

12. The combination with a reciprocating broach-supporting carriage having a broaching tool; a work support perpendicular to the path of movement of said tool and adapted to receive a slotted piece of work; a pivoted member movable about its pivot into the slot and having a transverse shoulder; and a pivoted arm having a shoulder adapted to engage said member and prevent its displacement during the broaching operation, the downward movement of said arm being limited by the shoulder on said member.

13. The combination with a reciprocating broach-supporting carriage having a broaching tool; a tapered work support perpendicular to the path of movement of said tool and adapted to receive a slotted piece of work; a pivoted member adapted to be moved about its pivot into the slot and against the bottom thereof to force said work to its seat; and means for preventing the displacement of said member during the broaching operation.

14. The combination with a reciprocating broach-supporting carriage having a broaching tool; a tapered work support perpendicular to the path of movement of said tool and adapted to receive a slotted piece of work; a pivoted member adapted to be moved about its pivot into the slot and against the bottom thereof to force said work to its seat, said member having an opening therethrough adapted to be alined with the axis of said tool; and means for preventing the displacement of said member during the broaching operation.

15. The combination with a reciprocating broach-supporting carriage having a broaching tool; a fixed bar parallel with said tool; a slide thereon; means for adjusting said slide transversely of said bar; a bracket secured to said slide having a seat for the free end of the broaching tool; and means between said seat and said carriage for supporting the work to be operated upon.

16. The combination with a reciprocating broach-supporting carriage having a broaching tool; a fixed bar parallel with said tool; a slide thereon; a bracket secured to said slide having a seat for the free end of the broaching tool; a member movable with said slide and adapted to clamp said tool into said seat; and means between said seat and said carriage for supporting the work to be operated upon.

17. The combination with a reciprocating broach-supporting carriage having a broaching tool; a fixed bar parallel with said tool; a slide thereon; a bracket secured to said slide having a seat for the free end of the broaching tool; a pivoted member movable with said slide and adapted to be moved into position to clamp said tool into said seat; and means between said seat and said carriage for supporting the work to be operated upon.

18. The combination with a reciprocating broach-supporting carriage having a broaching tool; a fixed bar parallel with said tool; a slide thereon; a bracket secured to said slide having a seat for the free end of the

broaching tool; and means on said bar between said seat and said carriage for supporting the work to be operated upon.

19. The combination with a reciprocating broach-supporting carriage having a broaching tool; a fixed bar parallel with said tool; a slide thereon; a bracket secured to said slide having a seat for the free end of the broaching tool; and a tapered stud perpendicular to said bar between said seat and said carriage for supporting the work to be operated upon.

20. The combination with a reciprocating carriage having a broaching tool; means for positioning a slotted piece of work in the path of movement of said tool; and a member fitting and adapted to be moved into the slot of said work.

21. The combination with a reciprocating carriage having a broaching tool; means for positioning a slotted piece of work in the path of movement of said tool; a member fitting and adapted to be moved into the slot of said work; and means surrounding the tool adapted to be adjusted against the face of the work.

Signed by me at 746–7 Old South Bldg., Boston, Mass., this 31st day of January, 1921.

FRANCIS J. LAPOINTE.

Witnesses:
WALTER E. LOMBARD,
NATHAN C. LOMBARD.