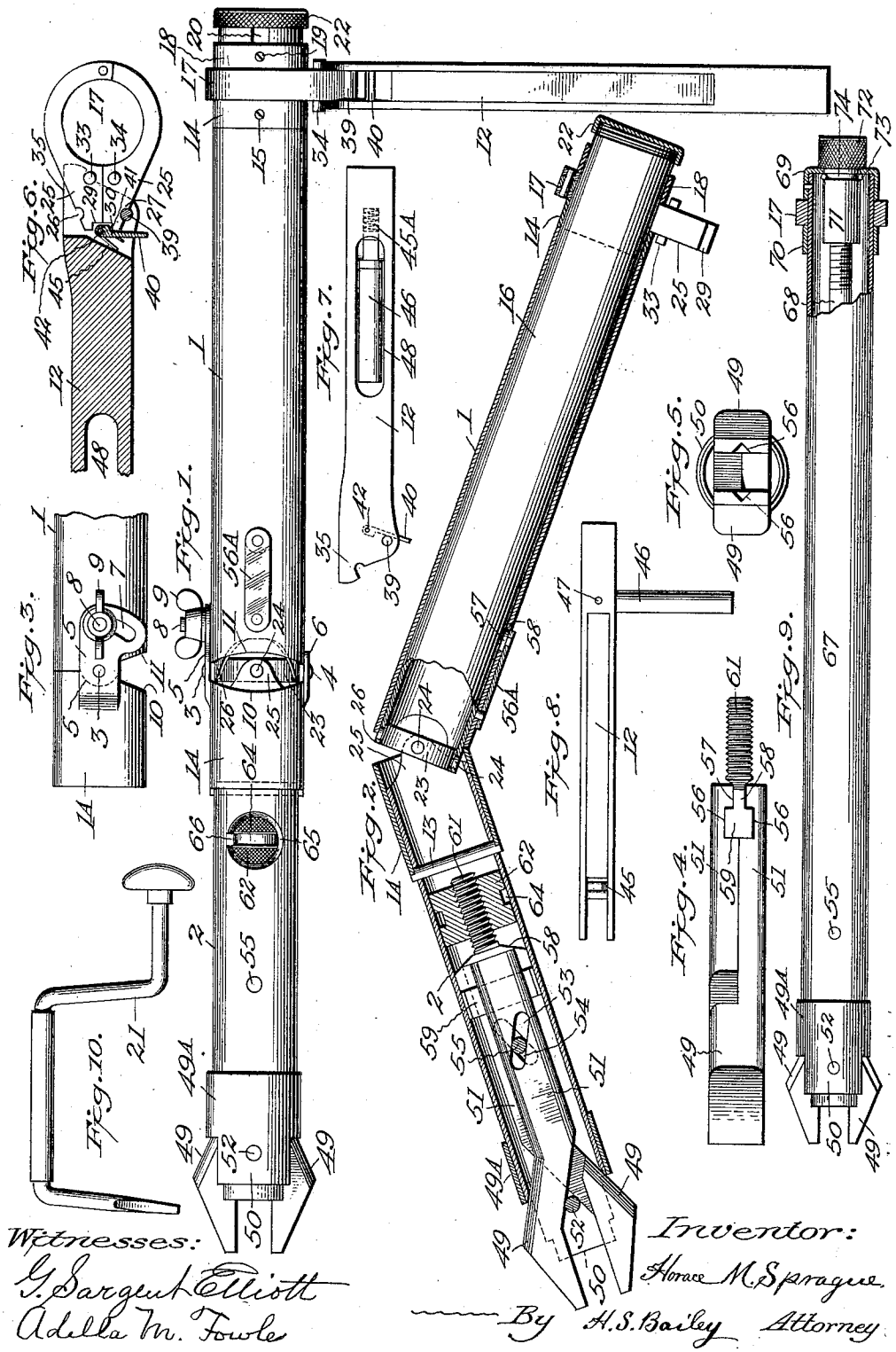
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ADJUSTABLE JOINTED HANDLE WRENCH.

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HORACE M. SPRAGUE, OF DENVER, COLORADO.

ADJUSTABLE JOINTED-HANDLE WRENCH.

1,090,506. Specification of Letters Patent. Patented Mar. 17, 1914.

Application filed March 25, 1913. Serial No. 756,732.

To all whom it may concern:

Be it known that I, HORACE M. SPRAGUE, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented a new and useful Adjustable Jointed-Handle Wrench, of which the following is a specification.

My invention relates to an adjustable jointed handle wrench, and the objects of my invention are, first, to provide a jointed handle nut-holding and turning wrench that can be applied to a nut in alinement with the axis of the nut and its bolt, as well as at angular positions thereto; second, to provide a wrench provided with a jointed handle portion that can be adjustably bent and set and operated in various predetermined angular positions, and third, to provide a wrench that can be operated by a ratchet movement device or by a crank lever, and that is especially arranged and adapted to be used in places not readily accessible to the use of the wrenches in common use, such, for example, as on the interior parts of automobiles.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which:

Figure 1, is a side elevation of the improved wrench, showing the parts in alinement. Fig. 2, is a longitudinal sectional view of the same, showing the parts at an angle to each other. Fig. 3, is a side view of a portion of the outer casing or sleeve, showing the manner of hinging the parts together, and the locking device for holding the parts at an angle to each other. Fig. 4, is a side view of the jaws, and the cross-head by means of which they are moved back and forth. Fig. 5, is an end view of the jaws and the supporting tube in which they are mounted. Fig. 6, is a plan view of the friction gripping device and operating lever therefor, the lever being in section. Fig. 7, is a side elevation of the friction grip operating lever, showing the same provided with a hinged crank handle which is housed in a slot in the said lever. Fig. 8, is a top view of the same, showing the crank handle in operative position. Fig. 9, is a side elevation partly in section, showing a straight unjointed wrench, and the manner of operating the same. And Fig. 10 is a side view of a crank lever which may be used in operating the wrench.

Similar letters of reference refer to similar parts throughout the several views.

Referring to the drawings: The numerals 1 and 1A and 2 designate the outside casing portions of my improved wrench. These outside casing portions 1 and 1A comprise a tube that is divided into two parts which are connected together by a pivotal joint consisting of pins 3 and 4 that are placed in eared portions 5 and 6 formed on the meeting ends of these two tubes and arranged to overlappingly register with each other. The ear 5 is extended and enlarged to permit a segment slot 7 to be formed through it, which slot is concentric to the pivotal pin 3, and a threaded pin 8 is secured to the tube 1 in a position to project up through the segment slot. A thumb nut 9 is threaded to the end of the threaded pin and arranged to clamp the ear 5 to the tube 1.

The two tubes 1 and 1A have a portion of each cut away at 10 and 11 to permit them to have a swinging angular movement relative to each other, that varies from straight alinement, which is defined when they come together end to end on one side to an angle of about sixty degrees or more on their cut-away sides, and these two casing tubes can be locked together by the thumb nut to stand in any desired angular position within the limits of their relative angular movement. The part 1, I term the handle part of the wrench, as the operator grasps it in one hand while reciprocally working the ratchet lever 12, with the other hand. The casing 1A is a short piece of tube that is rotatably mounted on the adjacent end of the casing 2, and its free end rests against an abutment which, as illustrated, comprises a pin 13, although a collar or shoulder portion may be used instead of the pin, if desired.

The handle tube 1, and the tube 1A, are held from moving away from the abutment pins 13, by a collar 14, and set screw 15, that are mounted on a tube 16 rotatably mounted within the handle casing tube 1. This tube 16, extends far enough beyond the free end of the handle tube 1, and the collar 14, to receive a frictional gripping ratchet head 17, at the outside of which a collar 18

is secured by a set screw 19; at the side of the collar 18, a crank handle receiving aperture 20 is formed in which one end of a crank handle 21 is adapted to fit when it is desired to turn the wrench by a crank handle instead of with the ratchet lever and its head. On the outer end of the tube 16, a cap 22 is preferably placed. The tube 16 is connected to the casing tube 2 by a universal joint which consists of the ring 23, provided with right angularly arranged pins 24 that project loosely into ears 25 and 26 formed at diametrically opposite points on the end of each tube and positioned at right angles to each other. This universal joint between the inner tube 16 and the casing 2 enables these parts of the wrench to be turned inside of the outside casing handle tubes 1 and 1A, by the ratchet head 17 or by the crank lever 21.

My invention contemplates the use of any kind or type or character of ratchet movement mechanism for rotating the inner tube 16 and the outer casing 2. I preferably, however, use and have illustrated in connection therewith, a friction grip ratchet movement wrench which is arranged to grip the tube 16 without lost motion instantly when applied to turn the tube 16, and is a reversible turning movement wrench that can be quickly changed to turn the tube and consequently casing 2, in either direction. There are a number of ways in which the head 17 of my frictional ratchet turning device can be made to grip the tube 16 with a frictional contact grip. I preferably, however, carry out this feature of my invention in the following manner: The head 17, comprises two substantially semi-circular members, which are hinged together at one end, while their opposite ends terminate in lugs or elongated portions 25, adapted to receive one end of the operating lever 12, as will be hereinafter explained, a very slight space remaining between the opposing faces of these lugs, when the parts of the head are clamped upon the tube 16, so as not to prevent their gripping of the said tube.

Stepped shoulders 29 and 30 are formed on the outer ends of the lugs 25, and semi-circular recesses 26 and 27 are formed in their outer faces near the ends thereof. The lugs 25 are also provided with pins 33 and 34, which extend through the lugs and project far enough from their opposite sides to act as abutments for hook shaped portions 35, of the lever 12. This end of the lever 12 is bifurcated to provide the hook portions, and the space between them is wide enough to allow them to fit loosely over both of the lugs 25 far enough to permit the said hook ends to engage one or the other of the pins 33 and 34. A pin 39 extends through the hook portions, and is positioned to fit into either one or the other of the semi-circular recesses 26 or 27, depending on which way the handle is placed on the lugs 25, it being made to be reversed from one of the lug portions of the head to the other whenever it is desired to reverse the direction of the turning movement of the inner tube 16.

Back of the pin 39 a spring controlled finger operative holding pawl 40 for locking the handle to the ends of the lugs of the ratchet head is placed. This pawl is mounted in the recess between the members 35, and comprises a short strip of metal that is pivotally mounted on a pin 42, extending through the members 35. This pawl has a shoulder 41, adapted to normally engage one or the other of the stepped shoulders 29 or 30 of the lugs 25, thus preventing the hooked portions from becoming disengaged from one or the other of the pins 33 or 34. But when the projecting end of the pawl is pressed down, its shoulder releases the stepped shoulder on the lug 25, and permits the lever to be disengaged from the said pin, so as to be reversed. Thus the lever 12 is secured to the opposite sides of one of the lugs 25, by its pin 39 and the shoulder of its pawl and its hooked ends are locked to the abutment pin of the other lug 25, and a reciprocal movement of the handle of the lever clamps the two sides of the ratchet head upon the tube 16, causing the head to grip the tube and turn it with the lever when the lever is moved in one direction, and to release or relax the clamping action of the two sides of the head when moved in the opposite direction, which causes the head to slip on the tube.

To rotate the tube in the opposite direction, remove the handle by moving the pawl back by pressure of the fingers, and turn it over to engage the pin on the opposite lug 25. The pin 39, then engages the opposite recess 26 or 27, as the case may be, and the lever is operated as before. The pawl extends beyond the sides of the handle far enough to permit its end to be engaged by an operator to move the pawl. The shoulder 41 of the pawl is positioned to engage one or the other of the stepped shoulders 29 and 30, in the ends of the lugs of the ratchet head when the handle is applied to it, as will be presently described.

Upon the pin 42, upon which the pawl is pivoted, I mount and secure a coiled spring 45, one end of which bears upon the pawl, while its other end bears with a resilient pressure against the bottom wall of the bifurcated end of the handle, and it holds the pawl with a resilient pressure against the stepped shoulders. This ratchet handle is connected to the ends of the lugs of the ratchet head in the following manner: The operator grasps the handle in one hand and while holding it in alinement with the ratchet head, places his thumb against

the pawl and moves it away from the locking pin 39, which allows the locking pin to be placed in one of the concaved recesses 26 or 27 in the head below the terminal end lugs. He then moves the handle around to move its hooked ends around one of the pins 33 or 34 on the opposite side lug of the ratchet head, and when this is done he gives to the handle a short reciprocative ratchet movement, and the ratchet head will grip the tube and move it in one direction of this reciprocal movement, and will slip in the other direction. In case he desires to move the inner tube 16 in the opposite direction from what he has been moving it, it is only necessary for him to move the handle from the ratchet head and reverse it so that it will be applied to the opposite side portion of the ratchet head. To remove the handle he has only to place his thumb back of the spring and draw it away from the pin 39, and the handle will come immediately off from the ratchet head. In order that the handle may be rotated continuously when desired, I provide it with a crank handle 46, which is pivotally secured by a pin 47 at one end of a slot 48 that is formed in the handle, and is held by a spring 45^A to lie along the handle in this slot, but can be swung out of the slot to stand at right angles to the handle, its spring being arranged to hold it in that position.

The outer casing 2, forms a housing for the nut gripping and turning jaws 49 of my improved wrench, and they are operatively mounted therein in the following manner: Upon the end of the casing 2, a sleeve 49^A is secured to reinforce its outer end. The end of this sleeve, as well as the end of the casing, is divided into two oppositely positioned side portions 50, separated by a recess, that extends into the end of the tube a short distance. The jaws 49 are each provided with long shank portions 51, and each of which is provided with a rabbeted step portion extending into one half of the thickness of each jaw, so that the shank portions of the jaws are arranged to overlap and lie on top of each other, and to extend into the casing to near its opposite end. The jaws are arranged to stand with their nut engaging surfaces parallel to each other and open about a quarter of an inch when closed to their smallest nut receiving size, and their shank portions are converged to the axial center between them by oppositely arranged converging beveled sides. At the point where they cross, the axial center line of the jaws of the wrench that is common to both, a pin 52 is extended between them from the opposite sides of the end of the casing tube and its sleeve 49^A, through which it extends. As these converging angular surfaces extend from each jaw across to the outside of the shank portion of the other jaw, when the jaws are pushed against this pin 52 they open evenly together by sliding on this pin, and they are caused to remain parallel to each other as they open, by a pair of angular slots 53 and 54 and a pin 55 which extends from the tube through them. These slots are formed in the shank portions of the jaws to cross each other and are each arranged at the same angle to the nut engaging surface of its respective jaw and parallel to the said converging angular surfaces, and also arranged to cross each other so as to allow the pin 55 to be extended through both of them at the axial center of the longitudinal axis of the jaws and of the casing 2.

Extending across the inner ends of the shank portions, a transverse slot 56 is formed partially in each and centrally between the two, and extends in a narrower slot 57 through to the ends of both shanks. In the narrower of these slots, a cross head 58 is loosely mounted and can slide on its opposite side surfaces, and in the transverse deeper slots, the shouldered end 59 of the cross head is loosely mounted so that the ends of the shanks can slide reciprocally laterally on this shouldered end as the jaws and their shanks are moved forward and backward and laterally to and from their longitudinal axial center in a manner to hold the nut engaging surfaces of the jaws parallel to each other, as will be explained more fully hereinafter. This cross head 58 is provided with a threaded stem 61, which projects from its free end along the longitudinal axis of the jaws and their shanks for a short distance, and is threaded to a finger turning nut 62, that is rotatably mounted within the casing tube 2. This nut 62, is a knurled nut having a circumferential neck groove 64 formed around it between its ends, and on opposite sides of the casing 2, apertures 65 are formed large enough to allow the thumb and finger to grasp the nut and rotate it, while it is held in against longitudinal movement in the tube by a key lug 66, which is turned down into the neck portion of the nut from the surface of the casing tube adjacent to one side of one of the apertures. As this nut is threaded loosely on the threaded stem of the cross head when it is turned thereon the cross head is either drawn toward the nut or moved away from it, and the shanks of the jaws are also either drawn toward the nut or pushed away from it. When the nut is turned to push the cross head away from it, the crossed angular slots of the shank portions of the jaws slide on the pin 55, and the angular surface of each jaw also slides out on the pin 52 and the jaws, and their shank portions are moved to open wider in parallel alinement to each other and at equal distances from the longitudinal axis of the jaws

and its casing and to move together synchronously as they open and close.

The above description sets forth the detail description and operation of my improved wrench.

The general application and operation is as follows: The wrench is adapted to be used on nuts on parts of automobiles and in other places to which it is not convenient to apply the wrenches in common use, and in applying my wrench to a nut in such a place, the handle and its casing, which may be made in lengths varying from about 15 to 24 inches in length, may be used as a handled wrench its jointed parts being moved into axial alinement with each other and locked there by the thumb nut 9 of the handle's tilting joint. Or if desired, the handle may be pivotally tilted on the jaw supporting casing portion of the wrench and locked in any angular position desired, within the range of its angular movement by the same nut of the handle tilting joint. The operator then opens or closes the jaws of the wrench to fit the nut and applies the handle to the friction head and turns the inner tube with a step by step rotary movement by a reciprocal movement of the ratchet handle and its ratchet head. This step by step rotary movement of the inner tube 16, is transmitted through the medium of the universal joint to the casing tube, the slotted end of which engages the jaws, causing them to turn with the casing tube 2. The operator can thus turn a nut on its bolt or turn it off from its bolt, as he desires, with the wrench; but when he changes from a rotary movement of the inner tube 16 in one direction, to a rotary or turning movement in the opposite direction, he has to reverse the handle on the head, as above described. The opposing surfaces of the jaws 49 are provided with oppositely arranged registering V-shaped grooves 56 in order that they may receive and hold the square shank ends of screw drivers, auger bits, twist and flat drills and other square shanked tools that an operator may desire to use in connection with my improved wrench. A spring brake or drag 56^A is used to hold the inner tube 16 from rotating too freely. It comprises a blade of spring steel secured at one end to the handle casing, and having a head portion 57 on its opposite end that extends through an aperture 58 in the casing and bears with the resilient tension of the spring blade against the surface of the tube 16.

In Fig. 9 I have illustrated a modification, in the form of a straight, unjointed wrench. In this wrench I employ a single tubular body member or handle 67, and the jaws and cross head are of the same form as shown in Figs. 1 and 2. The cross head, however, has a stem or rod 68, which extends to within a short distance of the rear end of the tube, and its rear portion is threaded. The tube is closed by a cap 69, between which and a ring 70, which is secured to the tube, the friction gripping device 17 is held. A cylindrical form of nut 71, extends through a circular aperture in the cap 69, and engages the threaded end of the rod 68. The nut has a knurled head 72, of slightly greater diameter than that of the nut, and this head bears against the outside of the cap. A divided resilient ring 73, is sprung into an annular groove 74, in the nut, and bears against the inner face of the end of the cap. Thus the shoulder formed by the head of the nut, and the ring 73, hold the nut against lateral movement and limit the same to a rotary movement, by which the rod and cross head, with the jaws, are moved back and forth, as will be understood.

My invention is strong and is compactly built and is especially arranged and adapted to be inserted and used in inaccessible places where it is difficult to use the wrenches in common use.

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

1. In an adjustable jointed handle wrench, the combination of the handle casing provided with a joint intermediate of its ends, arranged to permit one part to swing from a straight alinement to an angular position with the other, a segment on one part extending over the other part, and a finger screw connected to the other part and arranged to lock said segment and one part of said handle at any predetermined angle to or in straight alinement with the other part.

2. An adjustable jointed handle wrench, comprising a suitable jointed handle portion and means for securing said jointed handle portion in adjusted positions, a casing secured to one part of said jointed handle portion, jaws secured in one end of said casing, means, including a thumb nut connected to said casing for opening and closing said jaws, an extension member rotatably mounted within said handle and connected to said casing member by a universal joint, and extending beyond said handle member, and means attachable to said extension member for rotating it and said casing and said jaws in either direction.

3. An adjustable jointed handle wrench, comprising a suitable casing jointed intermediate of its ends, and a jaw supporting casing rotatably mounted in one end of said casing, a pair of jaws mounted in the jaw supporting end of said casing, means connected to said casing for moving said jaws to open and close the same, a rotatable member within said handle portion of said casing connected to said jaw supporting casing by a universal joint, means for rotating

said universally connected jaw supporting members and said jaws in either direction, and means for adjustably setting said jointed and universally joint connected members in different positions relative to each other.

4. In an adjustable jointed handle wrench, the combination of the jointed handle casings, a jaw supporting casing revolubly secured to one end of one of said handle casings, a tube rotatably mounted in the free end of one of said handle casings and connected to said jaw supporting casing by a universal joint, and a pair of jaws supported in said jaw supporting casing, means including a finger nut for moving said jaws to open and close the same, and a suitable friction wrench member secured to the rotating tube within said handle member for rotating said jaw supporting casing and said jaws.

5. In a wrench as specified, the combination of a jointed handle member, a jaw supporting casing and a jaw turning tube within said handle member and connected by a universal joint to said jaw supporting casing, with a pair of jaws having opposing beveled shank portions extending into said casing and provided also with intersecting apertures arranged at opposite angles to the longitudinal axis of said jaws, and fixed pins extending through said casing through said apertures, a cross head in said casing provided with slideways extending transversely across the longitudinal axis of said jaws, guideways in the shank portions of said jaws fitting slidably on the slideways of said cross head, a threaded stem on said cross head, a knurled nut rotatably mounted in said casing threaded on said stem and arranged to be grasped and turned by the finger of an operator to move said cross head and jaws to open or close the same, and means for rotating said jaw turning tube.

6. In a wrench as specified, the combination with a tubular member, of jaws therein comprising superposed shanks having oppositely inclined portions which terminate in parallel gripping ends, said shanks having oppositely inclined, registering slots, a pin extending through said tube in engagement with the inclined portions, a pin extending through the tube and through the said oppositely inclined slots, and means for projecting or retracting said jaws relatively to the tubular member.

7. In a wrench as specified, the combination with a tubular member, of jaws therein, comprising superposed shanks having oppositely inclined members which terminate in parallel gripping ends, said shanks having registering transverse recesses and oppositely inclined slots, a pin extending through the tubular member in engagement with the inclined members of the jaws, a pin extending through the tubular member and through the said oppositely inclined slots, a cross head having a shouldered portion engaging the said registering recesses in the shanks, a threaded extension on the cross head, a nut on said extension, and means connected with the tubular member for limiting the nut to a rotary movement.

8. In a wrench as specified, a two-part sleeve having a hinge joint, and means for locking the parts at an angle to each other, a two-part tube extending through said sleeve, having a universal joint connection coincident with the hinge in said sleeve, superposed jaws in said tube having oppositely inclined bearing faces and oppositely inclined registering slots, pins passing through said tube one of which engages the said inclined faces, while the other extends through the said oppositely inclined slots, a cross head engaging the rear ends of said jaws, having a threaded shank, a thumb nut on said shank and means for preventing lateral movement of the same with respect to the tube, said tube having opposite apertures to expose the nut, and a reversible friction grip on the rear end of said tube.

9. In a wrench as specified, the combination of a tube composed of two sections connected by a universal joint, a nut in one section, having an annular groove and accessible through apertures in opposite sides of the tube, a lug projecting from the tube into the said annular groove, a cross head having a threaded stem which is threaded to the said nut, superposed jaws connected to and laterally slidable on said cross head, means for spreading and closing said jaws as they are moved back and forth by the nut, a two-part sleeve surrounding the tube, said parts having a hinge connection coincident with the universal joint, means for preventing endwise movement of the sleeve on said tube, a grip adapted to frictionally engage the rear end of the tube, and a hand lever for operating said grip.

10. In a wrench, the combination with a tube, jaws mounted in the tube, and means for adjusting said jaws, of means for axially turning said tube, comprising a divided friction ring comprising two substantially semicircular members hinged together at one end, projecting lug portions at their opposite ends, the terminal ends of said lugs being provided with stepped shoulder portions which register with each other, said lug shaped ends being provided with semicircular recesses on their opposite sides, lever receiving portions on each part of said ring portions opposite said hinged connections, pins projecting through said lever receiving portions, a lever for operating said friction ring, having a bifurcated end, the terminal ends of which are hooked to engage one or the other of said pins as desired, a pin extending through said bifurcated end

and adapted to engage one or the other of said semi-circular recesses, whereby when the hooked ends engage the pin in one member of the ring the pin in said lever engages the semi-circular recess in the other member of the ring, and a spring actuated pawl in said lever arranged to engage the stepped shouldered portions of said lugs.

In testimony whereof I affix my signature in presence of two witnesses.

HORACE M. SPRAGUE.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."