J. C. TASSEY.

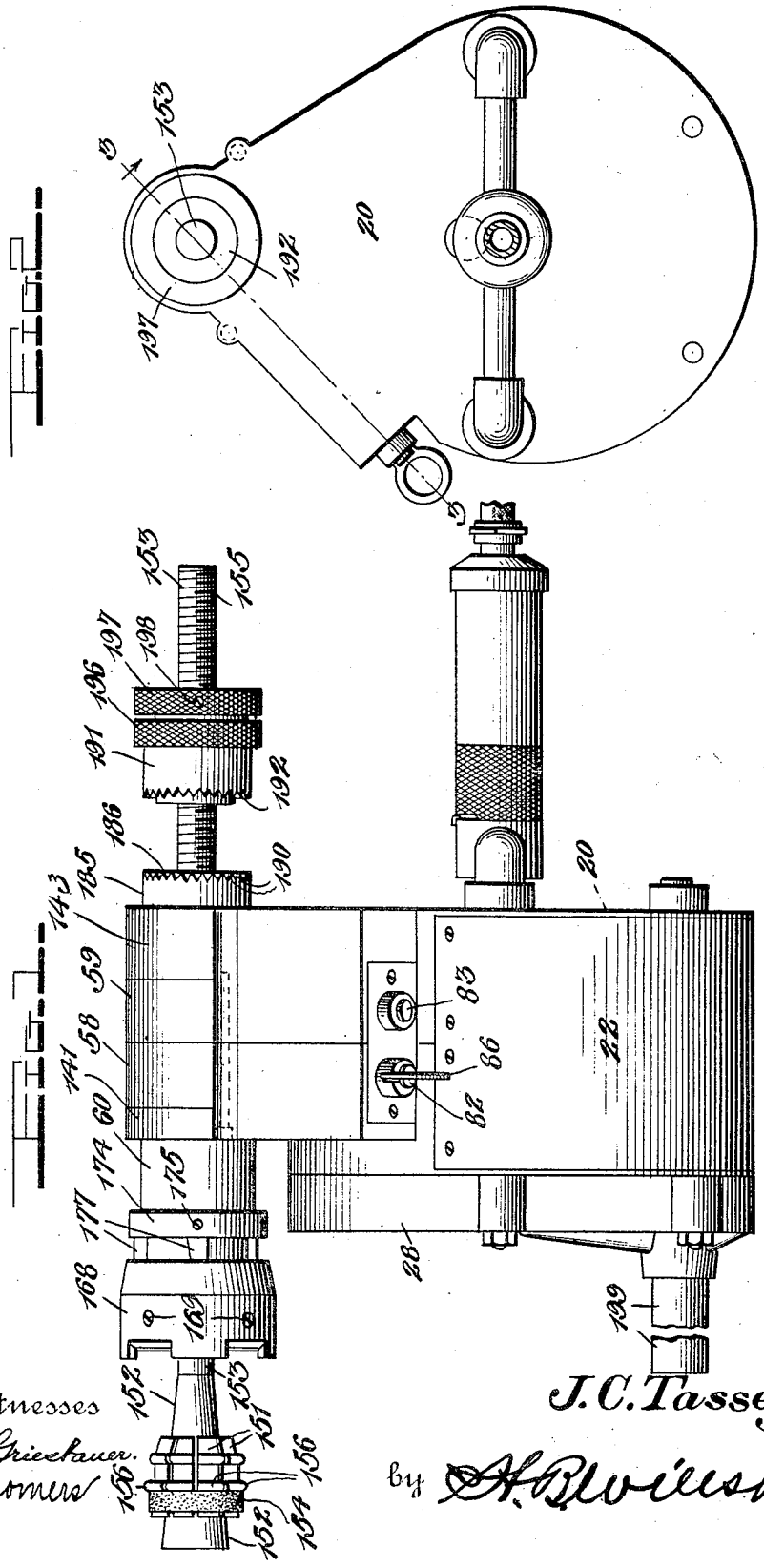
TUBE EXPANDER.

APPLICATION FILED FEB. 19, 1912.

1,055,571.

Patented Mar. 11, 1913.

2 SHEETS—SHEET 1.



Witnesses

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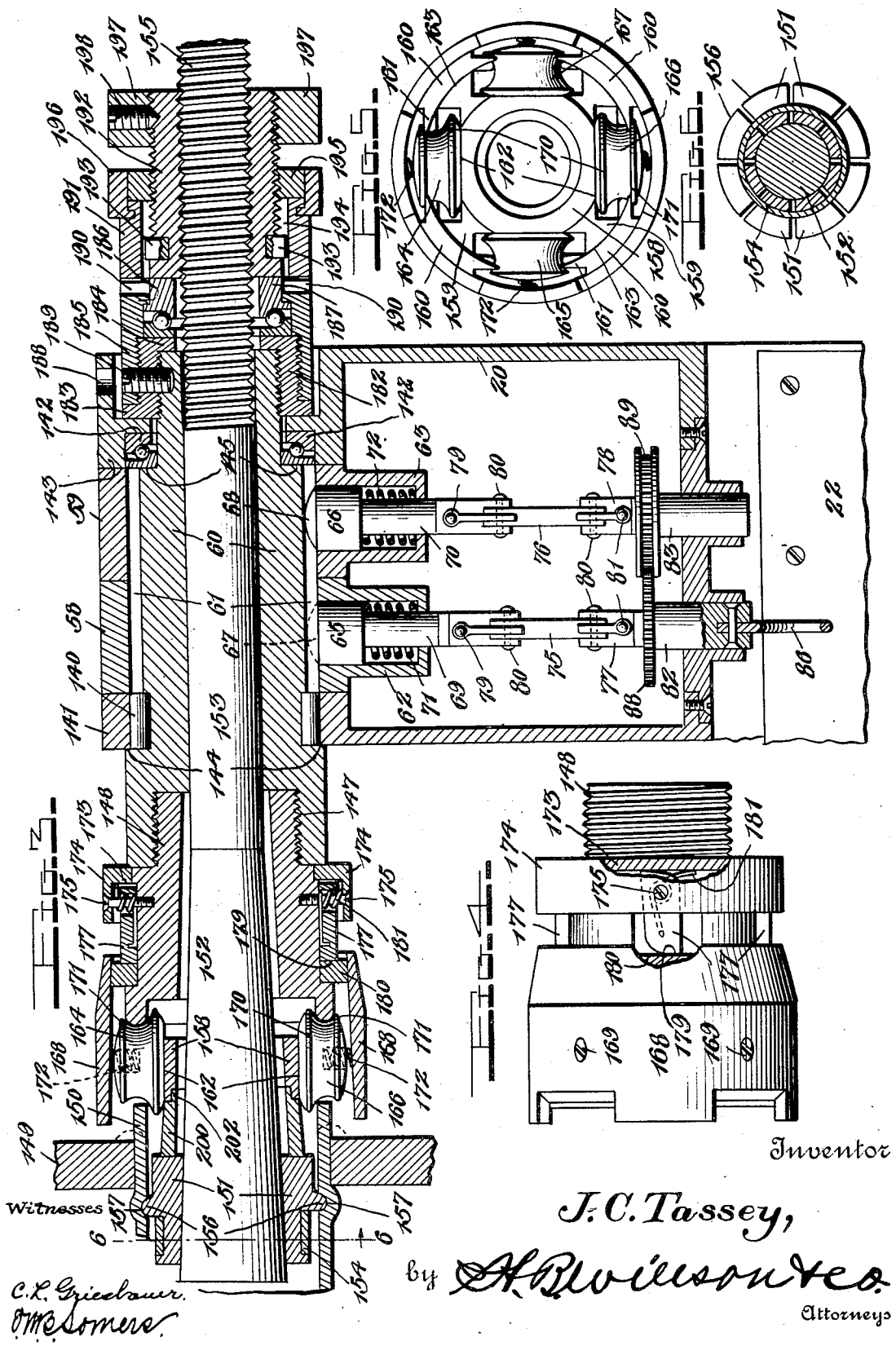

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UNITED STATES PATENT OFFICE.

JOE CEPHAS TASSEY, OF NASHVILLE, TENNESSEE.

TUBE-EXPANDER.

1,055,571. Specification of Letters Patent. Patented Mar. 11, 1913.

Original application filed May 25, 1911, Serial No. 629,483. Divided and this application filed February 19, 1912. Serial No. 678,490.

To all whom it may concern:

Be it known that I, JOE C. TASSEY, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Tube-Expanders; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to devices for the expansion of the ends of boiler tubes, the present application being a division of a prior application filed by me May 25, 1911, Serial No. 629,483 such division being made on compliance with the requirement of the Patent Office.

The primary object of the present invention is to provide a tube expander of improved construction, adapted to be operated by a motor.

A further object of the invention is to generally and specifically improve the construction of the several parts comprising a tube expander.

With these and other objects in view, the invention consists in the improved construction, arrangement and combination of the parts of a tube expander, hereinafter fully described and afterward specifically claimed.

In the accompanying drawings in which I have illustrated a preferred embodiment of my invention, together with as much other mechanism as is necessary to a proper understanding of this invention, Figure 1 represents a view of the expander in side elevation, in place in a motor casing, ready for operation; Fig. 2 represents a view of the same in end elevation looking at the right hand end as shown in Fig. 1; Fig. 3 represents a sectional view taken on the plane indicated by the broken line 3—3 of Fig. 2; Fig. 4 represents a detail view in elevation of a part of the expander head detached; Fig. 5 represents a front end elevation of the expander illustrated in Fig. 4; Fig. 6 represents a transverse vertical sectional view taken on the plane indicated by the broken line 6—6 of Fig. 3.

Like reference characters mark the same parts wherever they appear in any of the figures of the drawings.

Referring specifically to the drawings, the casing for inclosing the motor and ratchet mechanism for operating my tube expander includes substantially oval shaped heads or ends 20 and curved connecting sides and bottom 22 the pointed ends of the oval shaped heads being upward, and an additional casing as shown at 28, is secured to the left hand end of the main casing for containing parts of the motor. There may project from this additional casing 28 a guiding pipe or bar 199 spaced below the tube-expanding mechanism in such position that when inserted into one of the boiler tubes said mechanism will be in position to operate on the next one above—all as described below.

In the casing is a motor which moves arms, not shown, radiating from rings 58 and 59 surrounding the expanding tool stock 60 which is provided with longitudinal ribs 61 which at this point transform said stock into a ratchet wheel.

Extending radially from the rings 58 and 59 are sleeves 62 and 63 in which are mounted slidable and rotatable blocks 65 and 66 provided with ratchet teeth 67 and 68 on their inner ends normally held in engagement with the ribs 61 on the stock 60, by springs 71, 72. The stems 69, 70 of the blocks 65 and 66 are connected by means of blocks 77 and 78, links 75, 76, and suitable pivot pins 79, 80 and 81, to shafts 82 and 83 which are geared together by pinions 88 and 89, one of said shafts having a handle 86 by means of which this mechanism may be manipulated to turn blocks 65 and 66 to reverse the positions of the ratchet teeth with relation to the ribs 61 on stock 60, thereby reversing the rotation of the tool stock without reversing the motor, all as fully described in said original application before referred to.

The stock 60 of the expander is mounted in roller bearings 140 in a bearing sleeve 141 projecting upward from casing head 21, and in ball bearings 142 held in a bearing sleeve 143 projecting upward from casing head 20, the stock being prevented from moving longitudinally by a shoulder 144 which bears against the sleeve 141 and a shoulder 145 which bears the ball bearing 142 against the bearing sleeve 143.

The oscillating rings 58 and 59 hereinbefore referred to, which carry the sleeves 62 and 63 in which the pawls operate for engaging the longitudinal ribs 61 and the stock 60, are held against longitudinal displacement on the stock 60 by means of the

bearing sleeves 141 and 143, between which they are located, as clearly indicated in Fig. 3.

The inner end of the stock 60 is recessed and threaded as at 147 to receive the threaded end of a sleeve 148 hereinafter referred to.

At 149 is shown a portion of the tube sheet of a boiler, inserted in which is a portion of a tube 150. Within the tube 150, see Fig. 3 is shown a series of wedges 151 having their inner faces tapered to fit upon the tapered end 152 of the main bolt 153 of the expander. The main bolt 153 is threaded at its rear end as at 155 and is drawn into the middle of the wedges 151 to expand them by means hereinafter to be described, such expansion of the wedges causing their annularly projecting knuckles 156 to form grooves 157 in the tube just inside of the tube sheet 149. The wedges 151 are provided with suitable notches in their outer edges which, when the wedges are brought together as in Figs. 3 and 6 form an almost continuous annular groove to receive the elastic band 154 and prevent its displacement.

Mounted loosely on the tapered end 152 of the bolt 153 is a roller carrying frame comprising a ring 158 upon which are mounted radially projecting arms 159 carrying at their outer ends curved plates 160 having beveled side edges 161, said plates being arranged in a circle and being concentric with the ring. The outer faces of the ring 158 are flattened at points, and these flat faces, indicated at 162, in connection with the grooved sides 163 of the arms 159, and the edges 161 of the plates 160, tend to form a series of recesses, each of which is adapted to receive a roller as at 164, 165, 166, and 167. The ring 158, its radial arms 159 and the plates 160, and the rollers as specified all are inclosed within a cover sleeve 168, in which are seated screws 169 which project through the inner face of the cover sleeve beyond the plates 160, thereby preventing the entrance of said plates into the cover sleeve beyond a proper position.

To prevent wear upon the forward edge of ring 158 and the ends of the wedges 151, a friction ring 200 is placed slidably on the tapered end 152 of the bolt 153, with a plain forward end face to contact with the wedges, its opposite end being formed with a flange 202 to engage in an annular rabbet in the forward end face of the ring 158.

The rollers 164, 165, 166, and 167 are all provided with peripheral grooves and ribs formed at the edges of said grooves, the rib on the end of each roller which rests against the flat outer surface of the ring 158, as indicated at 170, being of greater diameter than the outer rib 171.

The edges 161 of the plates 160 project into the grooves of the rollers adjacent to the outer ribs 171 and the rollers themselves are kept in contact with the flat sides of the ring 158 by means of springs 172 seated in recesses in the outer ends of the rollers and bearing against the inside of the cover sleeve 168. The rollers 164 and 166 are beading rollers for turning the edge of the tube and the rollers 165 and 167, having grooves and ribs of slightly different contour, are for the purpose of finishing the bead after it is turned over by the beading rollers.

Shrunk or otherwise rigidly secured upon the outside of the sleeve 148 is a ring 173 which carries on its outer edge a sleeve 174 and a series of screws 175 pass radially through this sleeve into the sleeve 148, at the same time passing through an opening in each of a series of pawls 177 which are thus pivotally mounted on the outer face of the sleeve 148. These pawls are provided with flat ends 179, rounded at opposite corners and bearing against the ring 173 and a ring 180 which is rigidly secured within the cover sleeve 168. Around each of the screws 175 is a spring 181, one end of which bears against the ring 173 while the other end is turned into an opening in the pawl 177, the tendency of this spring being to turn the pawl into position to cause the flat ends thereof to jam against the rings 173 and 180, and thus prevent the turning of the ring 173 and the pawls in one direction, the rounded ends of the pawls permitting of their free turning in the opposite direction, the sleeves 174, ring 173, and the pawls and their springs, thus acting as a clutch to govern the relative rotation of the sleeve 148 and the cover sleeve 168.

The reduced outer end of the stock 60 is threaded exteriorly and receives on its thread a sleeve 182, the threads being left-handed. The sleeve 182 is provided with an outwardly projecting annular flange 183 which bears against the ring 143 and with an inwardly extending annular flange 184 which bears against the end of the stock 60. The sleeve 182 is also provided with an exterior thread which engages a sleeve 185 provided with an inwardly extending annular flange 186 which engages a flange on a ball bearing ring 187 so that when the sleeve 185 is screwed up tight, it will maintain the parts between the ball bearings in proper running position. An opening 188 is provided in the sleeve 143 through which to insert a screw 189 to rigidly secure the stock 60, sleeve 182, and sleeve 185 against accidental displacement.

The sleeve 185 is provided on its outer end with clutch teeth 190 which are adapted to engage with similar teeth on the end of a sleeve 191, the last named sleeve being slidable longitudinally on a sleeve nut 192 threaded on the main bolt 153, but prevented from rotating thereon by means of

lugs 193 projecting from the sleeve nut 192 into longitudinal grooves 194 in the interior of the clutch sleeve 191.

A ring 195 is threaded on the outside of the sleeve nut 192 and carries, shrunk or otherwise rigidly secured thereto, a knurled ring 196 provided with an inwardly projecting annular flange to engage with an annular channel in the clutch ring 191, whereby the travel of the ring 195 on the sleeve nut 192 caused by the turning of the knurled ring 196, will cause the longitudinal movement of the clutch ring 191 to engage or disengage its clutch teeth with the teeth 190 of the sleeve 185.

Upon the end of the sleeve 192 is threaded a knurled ring 197 and a screw 198 serves to fix the knurled ring against removal therefrom. The knurled ring 197 and sleeve nut 192 will be hereinafter referred to as the main nut.

The operation of the machine will be understood from the following description; the pipe or bar 199 is projected into a tube below the one to be expanded, and the wedges 151, on a portion of the tapered end 152 of the main bolt 153 of a size to permit of their being passed into the tube to be expanded, are placed in position as shown in Fig. 3. The stock 60 and its connected parts are then moved inward on the main bolt until the rollers contact with the outer edge of the tube. It is to be understood that the air has not yet been turned to rotate the stock. By pulling on the main nut, the bolt 153 will be drawn outward until the wedges engage tightly in the tube. The knurled ring 196 is turned upon the main nut until it rests against the same and until the teeth 190 have been disengaged from the teeth of the sleeve 185. By now turning the main nut on the bolt 153, the front surface of the main nut will bear against the roller bearing sleeve 187 and draw the main bolt 153 outward, which will spread the wedges 151 and tighten them in the tube, at the same time pressing the stock 60 and all of the parts up to the rollers against the edge of the tube. The knurled ring 196 is now turned upon the main nut until the teeth of the clutch sleeve 191 have been engaged with the teeth 190. In the meantime the rollers can be pressed against the outer end of the tube by turning up the knurled ring 196 on the main nut. The motor is now set in motion whereby the stock 60 is rotated and the roller presser causes the rollers to travel around on the end of the tube being expanded, the shape of their grooved peripheries causing the spinning of the extremities of said tube as the dotted line in Fig. 3 will indicate; and meanwhile from time to time the knurled ring 196 is set up tighter and tighter so that pressure behind the rollers is increased and they are fed slowly forward to their work. When the operation has been completed, the knurled ring 196 is turned back until the teeth of the clutch sleeve 191 are clear of the teeth 190, when the machine will be held between the roller bearings at one end and the ball bearing at the other and its continuous rotation will smooth off the work, which will loosen the main nut by whirling it off the end of the bolt and by tapping the end of the bolt with a soft hammer, the bolt will drop back in the wedges which will permit them to approach closely enough to each other on a smaller part of the tapered end 152, to be pulled out of the flue.

From the foregoing description taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion, and the miror details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention as claimed.

Having thus described my invention, what I claim is;

1. A device of the character described comprising a central bolt, a roller carrier loosely placed thereon, rollers on the roller carrier, a presser sleeve for advancing the rollers, a ring about the presser sleeve, a cover for the rollers secured to said ring, a flanged ring in rear of the first ring, pawls pivoted in the flanged ring having straight forward and rear ends with opposite corners rounded, and a spring about the pivot of each pawl tending to maintain it in position with its straight ends in contact with the two rings.

2. A device of the character described comprising a central bolt, a roller carrier loosely placed thereon, rollers on the roller carrier, wedges in a cylindrical series, means for yieldingly mounting the series on the main bolt, and a rubbing sleeve on the main bolt between the wedges and the roller carrier, said wedges and rubbing sleeve having plain meeting faces, the roller carrier having its forward end rabbeted and the rubbing ring having a flange on its rearward end engaging in said rabbet.

3. A tube expander comprising a central bolt, tube beading rollers, a presser sleeve on the bolt engaging said rollers, a ring rotatable and another fast on the presser sleeve, and pawls between the flanged ring and the rotatable ring.

4. A device of the character described comprising a casing having bearing sleeves, a tool stock journaled in said sleeves, tube turning rollers at one end of the stock, roller bearings at the opposite ends, a main bolt through the stock, a clutch sleeve on the stock beyond the roller bearing, a main nut

on the bolt adapted to be turned against the ball ring of said bearing, and a second clutch sleeve threaded upon the exterior of the main nut to be engaged or disengaged with the first named clutch sleeve.

5. A tube expander comprising a casing, a tubular stock, a main bolt slidable therein, a roller carrier on the forward end of the stock, sleeves on the casing surrounding the tubular stock, roller bearings at one end and ball bearings at the opposite end carried by the sleeves and supporting the stock, and means on the main bolt for securing the positions of the sleeves and stock.

6. A tube expander comprising a casing, bearing sleeves mounted thereon, ball and roller bearings in the sleeves, a tubular stock carried in said bearings, a main bolt, tube expanding rollers carried thereon, a roller presser sleeve carried by the stock, a double flanged sleeve threaded on the stock bearing against a bearing sleeve at one end and the tubular stock at the other end, a clutch sleeve carried by the double flanged sleeve, a main nut on the main bolt, and a clutch sleeve slidable on the main nut.

7. A tube expander comprising a casing, bearing sleeves thereon, a tubular stock mounted in ball and roller bearings in said sleeves and carrying a roller presser sleeve at its forward end, a main bolt in the tubular stock carrying rollers engaged by said presser sleeve, a sleeve threaded on the rear end of the tubular stock provided with an outer annular flange bearing against the adjacent bearing sleeve, and an inner annular flange bearing against the end of the stock, a clutch sleeve threaded on the flanged sleeve and provided with an inward flange, a ball bearing between said flange and the flanged sleeve, a main nut on the main bolt bearing against said ball bearing, a clutch sleeve slidable on the main nut, and means for moving said clutch sleeve on the main bolt.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOE CEPHAS TASSEY.

Witnesses:
E. S. PINCKARD,
J. B. BRADLEY.