No. 622,251. Patented Apr. 4, 1899.

R. S. MOORE.

HOLDING DEVICE FOR RIVETERS.

(Application filed June 23, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 2.

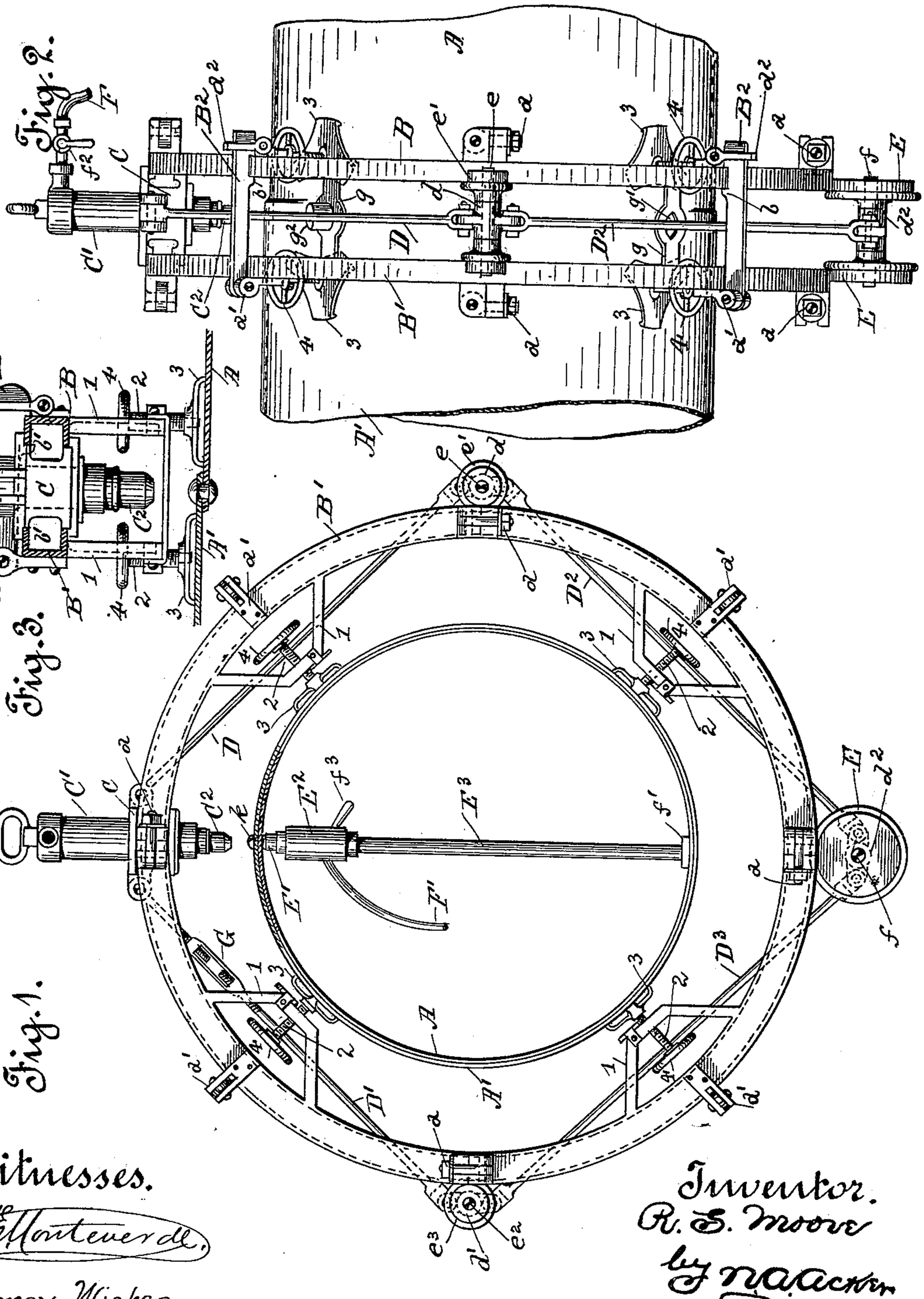

Fig. 3.

Fig. 1.

Witnesses.

F. E. Montenerde.

Elmer Wickes

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(No Model.) 3 Sheets—Sheet 2.

Fig. 4.

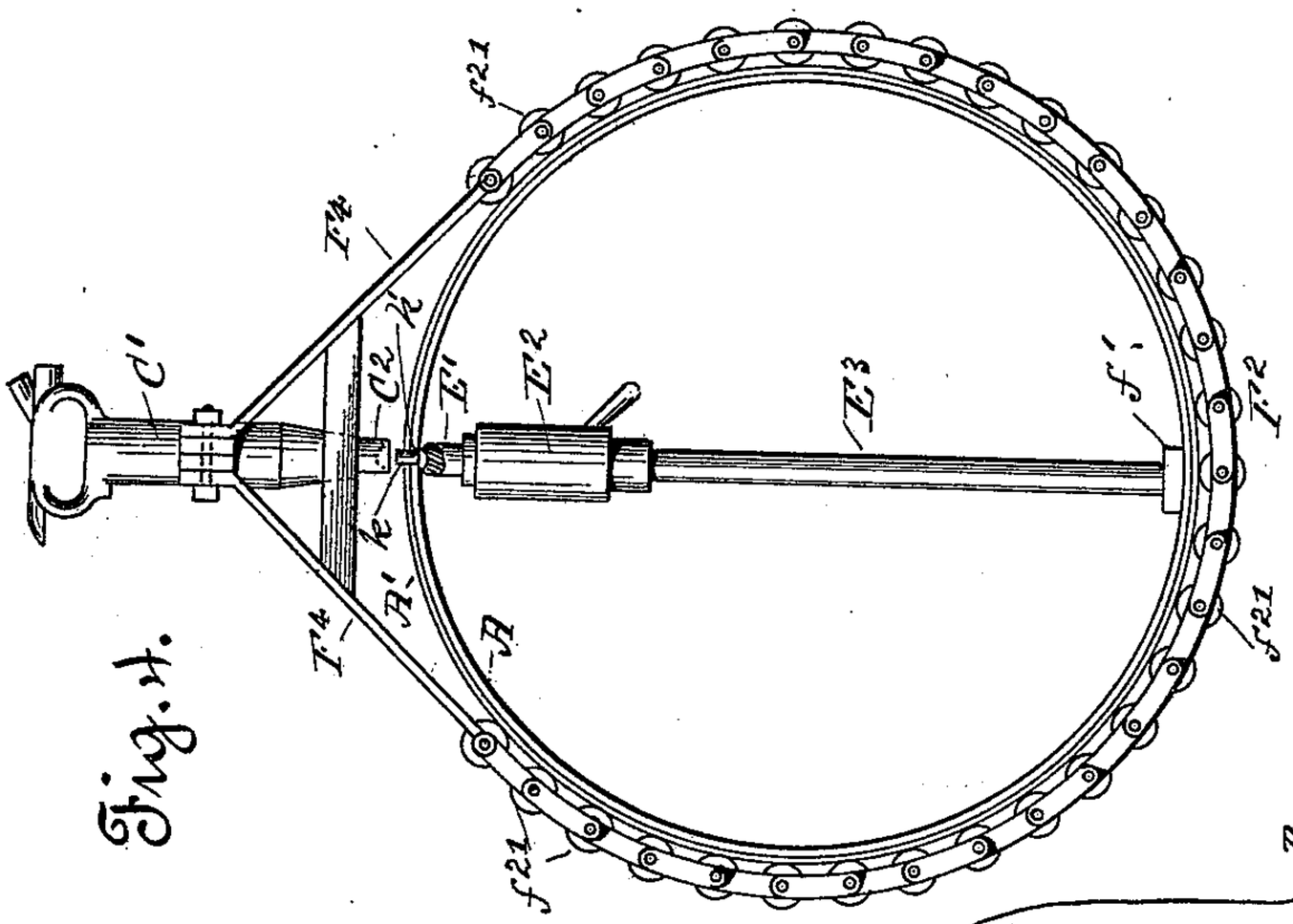


Fig. 5.

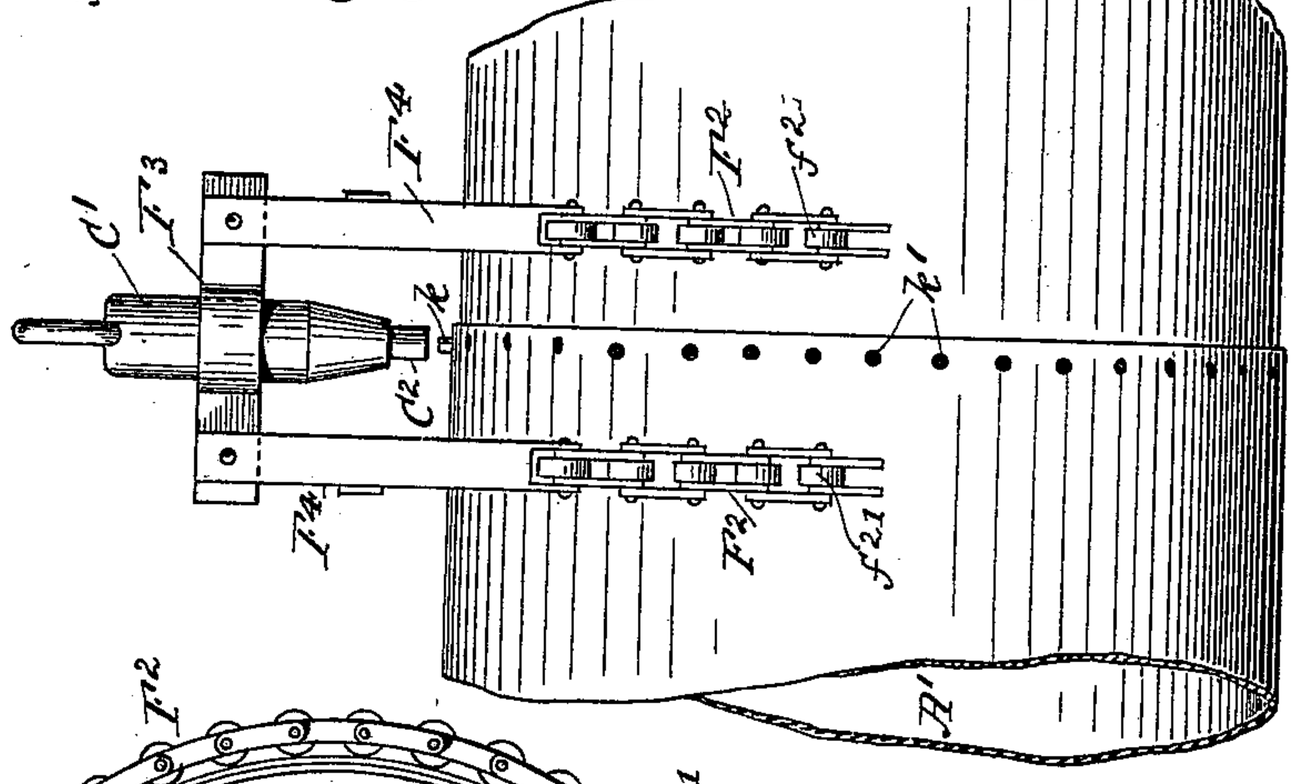
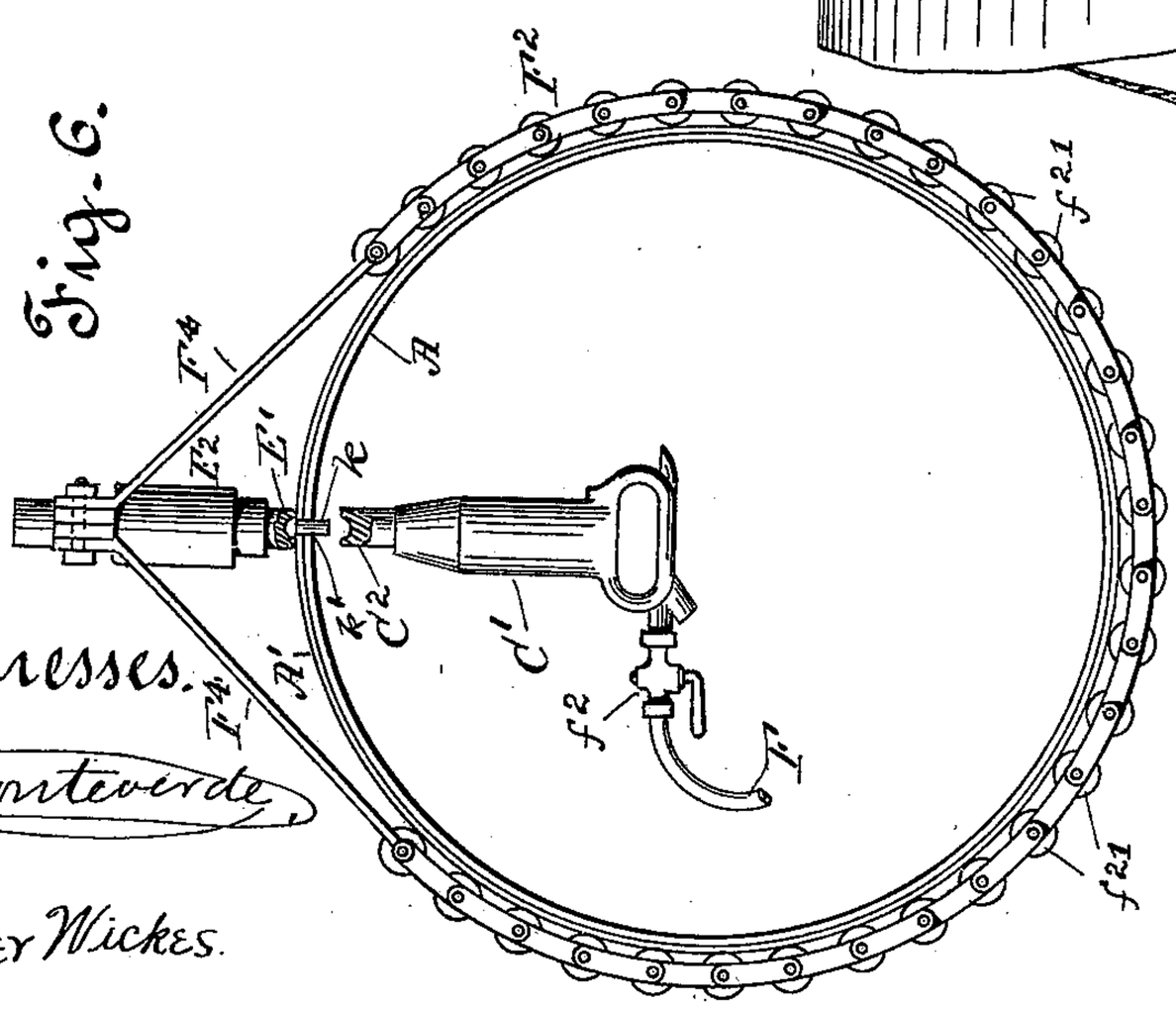


Fig. 6.



Witnesses.

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(No Model.) 3 Sheets—Sheet 3.

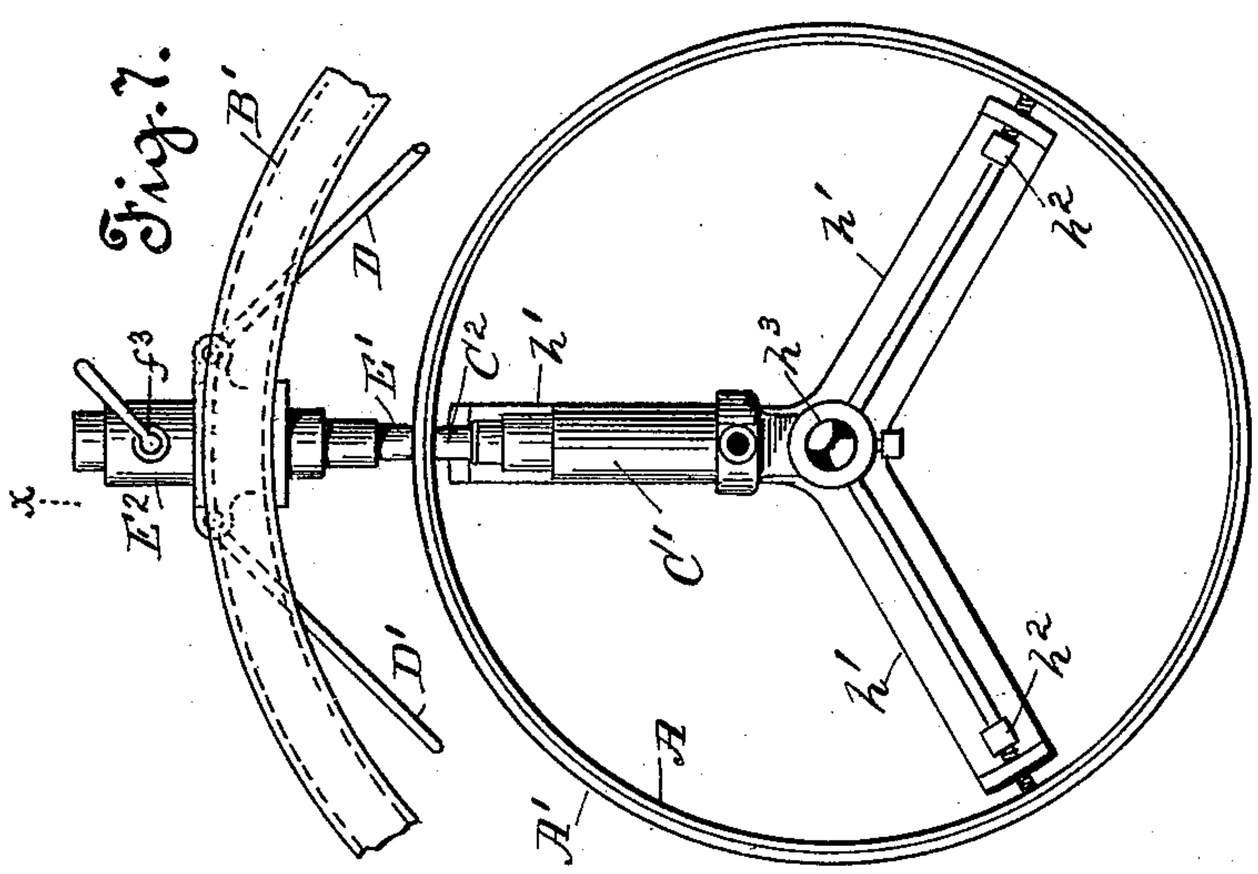

Fig. 7.

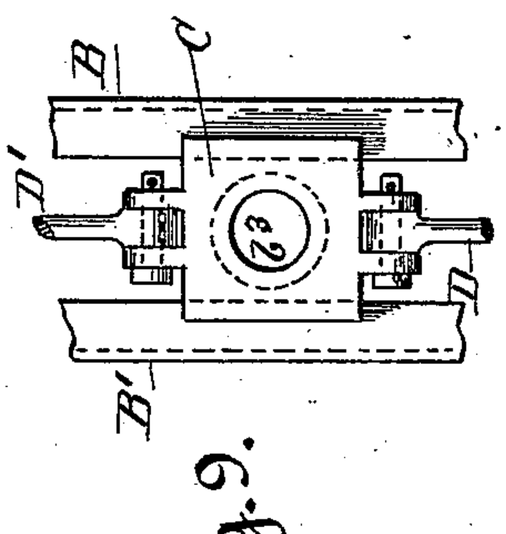

Fig. 9.

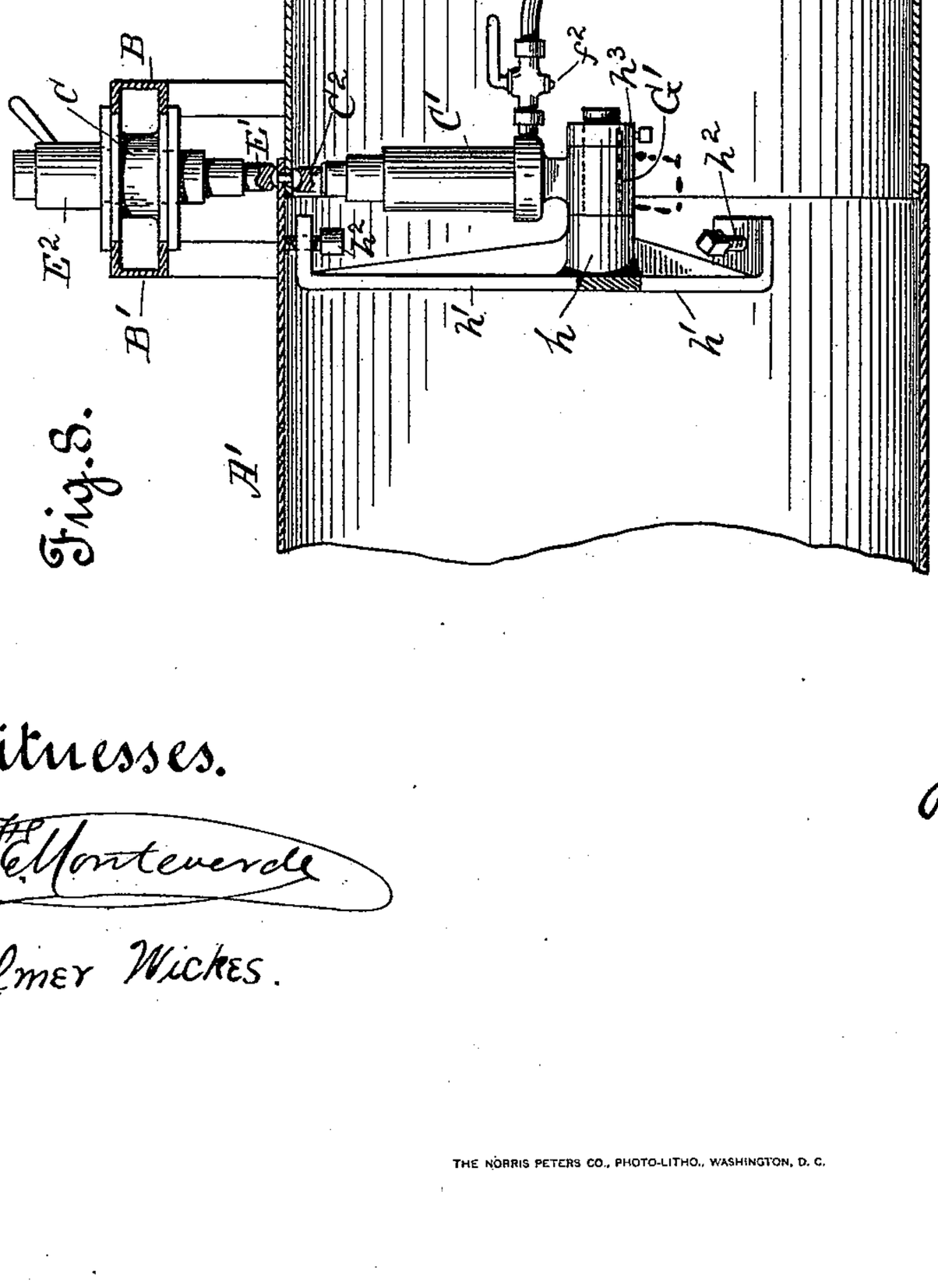

Fig. 8.

Witnesses.

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UNITED STATES PATENT OFFICE.

ROBERT S. MOORE, OF OAKLAND, CALIFORNIA.

HOLDING DEVICE FOR RIVETERS.

SPECIFICATION forming part of Letters Patent No. 622,251, dated April 4, 1899.

Application filed June 23, 1898. Serial No. 684,292. (No model.)

To all whom it may concern:

Be it known that I, ROBERT S. MOORE, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Holding Devices for Riveters; and I do hereby declare that the following is a full, clear, and exact description thereof.

This invention relates to a certain new and useful holding device for use in connection with the riveting of tubes, cylinders, or pipes designed more especially for use in the riveting of pipe-sections, or what is known as "line-pipe" riveting; and it consists in the arrangement of parts and details of construction, as will be hereinafter fully set forth in the drawings and described and pointed out in the specification.

Heretofore the riveting or joining together of pipe-sections has been accomplished either by hand or by the use of heavy and complicated power devices which head or upset the rivets by pressure exerted thereon. The objection to the former method of riveting is that the work is necessarily slow and the rivets are not uniformly driven, and, again, it requires the employment of expert riveters, while by the use of the power mechanism the pressure upon the inner wall of the pipe is so great that unless heavy and strong external devices be employed to compensate for such pressure the pipe is liable to be damaged by the undue strain to which it is subjected.

The main object of my invention is to provide a simple, comparatively light, and inexpensive holding device by means of which the pneumatic or other tool may be employed for the driving, heading, or upsetting of the hot or cold rivets during the riveting of the pipe-sections, the device being so constructed that it may be easily and quickly moved along the line of piping or from one section to another and adjusted to the rivet-holes of the sections in order that the riveter may be brought into alinement therewith and be permitted free movement the entire circumference of the pipe-sections.

The holding device comprises an annular frame adapted to embrace the entire circumference or a part diameter of the pipe-section, combined with a tool-holder either movable upon the frame, so as to traverse the circumference of the pipe, or it may be rigid therewith and the frame movably secured around the pipe-section. Hence, broadly stated, the invention may be said to comprise an "annular frame" (by which expression I wish to be understood as meaning a frame embracing the entire circumference of the pipe-section) either rigidly or movably connected or supported transversely to the length of the pipe-line in connection with a tool-holder mounted upon and carried by the frame.

By the use of the present holding device I am not only enabled to reduce the cost incident to the riveting of pipe-sections by dispensing with the necessity as to the employment of skilled or expert riveters, but all the riveting required to properly join or unite the pipe-sections may be quickly performed while the pipe is in position within the trench and the rivets driven at the rate of about fifteen hundred or more per day and more perfectly than they can be driven by hand, as is usual in this class of work. As the rivets may be driven at any distance from the end of the pipe, it allows all the pipe-sections to be assembled and temporarily joined in the ditch or trench and each section permanently riveted as the work progresses.

In order to comprehend the invention, reference must be had to the accompanying sheet of drawings, wherein—

Figure 1 is a cross-section of the pipe in front elevation, showing the holding-frame in position and the arrangement of the tool-holder with the riveter held therein and the position of the rivet-take-hold support within the pipe. Fig. 2 is a side view in elevation of a portion of the pipe-line or pipe-sections, showing the application of the holding-frame and tool-holder thereto. Fig. 3 is a detail sectional view of the annular frame in order to better illustrate the position of the tool-holder, showing a portion of the pipe-sections after the rivet has been headed or upset. Fig. 4 is a view similar to Fig. 1, showing a modification of the holding device, the same consisting of a flexible band or cincture. Fig. 5 is a side view in elevation of the mechanism illustrated by Fig. 4. Fig. 6 is a view similar to Fig. 4, illustrating the driving or riveting tool located inside the pipe and the take-hold

or anvil secured within the tool-holder outside of the pipe. Fig. 7 is a cross-section of the pipe in front elevation, the holding device being partly broken and the driving or riveting tool supported inside the pipe. Fig. 8 is a longitudinal section of the pipe, taken on line *x x*, Fig. 7; and Fig. 9 is a top plan view of the tool-holder.

In the drawings the letters A A′ are used to designate the pipe-sections to be riveted or joined together on circular seams after being preferably laid within the trench, ditch, cut, or line of work. Ordinarily the riveting is done from the outside, the hot rivets being held in place by an operator located inside the pipe, who receives the rivets passed through openings (not shown) formed in the pipe-sections (near the ends to be joined) and inserts same through the rivet-holes of the pipe-sections temporarily held together or secured by bolts or otherwise, which are removed as the parts are riveted together.

The holding device comprises a frame preferably consisting of two plates or rings B B′, Figs. 1 and 2, which are composed of distinct sections joined together by bolts *a*. These plates or rings are designed to loosely embrace or encompass the pipe-sections, one resting upon each section of the pipe a short distance from the other.

The ring-sections of the annular frame that encircle the pipe-sections when in place are fastened or held together by means of the lock or cross bars B^2, which bars are connected by hinged joint *a′* to one ring of the frame and secured to the other when thrown over by means of the clips a^2, hinged to said ring, which clips fit over the free end of the cross-bars B^2, Fig. 2. Each bar is formed with a depending lug *b*, which engages the inner face of one of the rings of the annular frame, so as to hold the frame-rings a given distance apart.

Inasmuch as the end of one pipe-section fits within that of the other section an even or unbroken surface is impossible. Consequently it is required that means be provided to adjust one frame-section to the other, so as to secure horizontal alinement and to hold the rings against displacement after being properly alined to each other and to the circumferential rivet-holes of the pipe-sections. To accomplish this, each section of the frame is formed with a downwardly-extending bracket or support 1, through which works a screw-threaded bolt 2, carrying at its lower end a foot 3. This foot rests upon the pipe-section of the respective rings, and either ring is raised or lowered by simply turning the hand-wheel 4 so as to move the screw-rod inward or outward. This form of adjusting mechanism is preferred where the frame is a rigid one, owing to its simplicity, although any other suitable adjusting device may be employed for this purpose.

By preference the annular frame is formed of channel-iron, and between the rings composing the frame is fitted to move the slide tool-holding block C, which block is formed with the side grooves *b′*, so the edges thereof embrace the upper and lower faces of the rings B B′, Figs. 2, 3, and 9. This slide-block is provided with a vertical central opening b^3, within which is fitted the cylinder C′, carrying the pneumatic hammer or riveter C^2, which when the annular frame is properly adjusted upon the pipe-sections is in line with or centered to the rivet-holes of the pipe. In order to permit free circumferential movement of the slide holding-block carrying the riveter, the same is connected by tie-rods D D′ to the sleeves *d d′*, which sleeves in turn are connected to the sleeve d^2 by tie-rods D^2 D^3. Through sleeve *d* is fitted axle *e*, carrying rolls *e′*, and within sleeve *d′* works axle e^2, carrying rolls e^3, while through sleeve d^2 works axle *f*, carrying the larger rolls E. Each of the rollers *e′*, e^3, and E works upon the periphery of the rings composing the annular frame, and while answering to hold the sliding tool-holding block in position also assists in moving the same around the frame. Owing to the weight of the riveter it is necessary that a counterpoise or counterweight be employed to assist the operator in holding the slide-block and riveter in proper position. This is accomplished by making the rolls E of such size that the weight thereof will approximately equalize that of the slide-block and riveting-tool combined. Hence only slight pressure is necessary to enable the operator to move the slide-block the entire circumference of the pipe-sections, as required, to head or upset the rivets in order to rivet-joint the pipe-sections.

When riveting is done from the outside, it is necessary that the workman inside the pipe be provided with an anvil or take-hold for the rivet, so as to hold the rivet in place while being headed or upset by the riveter. In the present case I make employment of an ordinary pneumatic holder or take-hold E′, which works in the usual cylinder E^2, mounted upon the support E^3. This support is provided at its opposite end with a head *f′*, which rests against the inner wall of the pipe at a point opposite to the rivet being headed or upset. By means of this support the workman is relieved of all strain incident to the holding of the rivet while being headed by the riveter. If the riveting is to be done from the inside of the pipe, the position of the holder or take-hold and riveter will be reversed—that is, the riveter will be attached to the support E^3 and the holder or take-hold fitted within the slide-block or tool-holder C. It is thus obvious that it is immaterial whether the riveting be done from the outside or inside of the pipe.

The air necessary to operate the riveter and the rivet-holder or take-hold, which serves as an anvil, is conveyed from an air-compressing apparatus located at point convenient to

the line of work by means of the flexible pipes F F′, the inlet of air to the respective tools being controlled by the cocks f^2 f^3.

Inasmuch as the pneumatic riveter and rivet-holding tool are well known and their operation and construction perfectly understood by those familiar with such tools, a specific description thereof is believed unnecessary in the present application, as they form no part of my invention, which relates to devices designed to permit the use of such tools in connection with the work of riveting.

Rigidity is secured at the bottom of the rings composing the annular frame in order to prevent spreading by riveting to the depending brackets l of opposing ring-sections a cross-tie plate g, Figs. 1 and 3. These cross-tie plates not only hold the rings of the frame an equidistance apart, but give firmness to the annular frame at its base, while the hinged lock bars or rods B^2 secure the same at the top. Each cross-tie plate is provided with a central opening g', through which fits a plug g^2, which plug is used to assist in alining the frame or centering the same to the rivet-holes.

By reference to Figs. 4, 5, and 6 a modification of the holding device is illustrated. In this case the annular frame is composed of two flexible bands or cinctures F^2, preferably composed of a series of links carrying rolls f^{21}. Each band or chain encircles the pipe-sections, and the free end of each is connected to a tool-holding block F^3 by means of bands or rods F^4. This constitutes a flexible frame which is adapted to be moved the circumference of the pipe-sections as the work of riveting progresses, to this extent differing from the frame set forth in Fig. 1 of the drawings, which is a fixed one and upon which the tool-holding block moves. Where the frame is a rigid one, the slack of the slide tool-holding block may be compensated for by means of the turn-bolt G, introduced in the tie-rod D′, Fig. 1, while in case chains be employed the tension may be regulated by taking out or putting in a link or by any suitable tension-regulating device.

Fig. 4 illustrates the riveter, held in the slide-block in order to rivet outside of the pipe, while in Fig. 6 the riveter is illustrated inside of the pipe and the holder or take-hold as being carried by the tool-holder or slide-block.

In Figs. 7 and 8 a modification of the inner support is illustrated and the riveter shown as working from the inside of the pipe and the rivet-holder or take-hold upon the outside of the same. In this case the inner support consists of a spider comprising a central hub h, provided with three radiating arms h', each of which carries an adjusting-screw h^2, used for centering and securing the spider in place within the pipe. Upon the hub h is loosely mounted the sleeve G′, which supports in the present case the riveting-tool. This sleeve is held upon the hub of the spider by means of the set-collar h^3. When thus held, the operator may easily turn or move the riveter to any desired position. The weight of the riveter may be compensated for, if found necessary, by attaching a counter-weight to the sleeve G′. (Shown by dotted lines in Fig. 8 of the drawings.)

In the operation of riveting or joining the ends of pipe-sections when the work is done from the outside an operator inside of the pipe receives a hot rivet handed him from the outside through an opening formed in the pipe. The rivet is then placed in the take-hold and the air-inlet cock opened, so that the take-hold is forced outward and the hot rivet k firmly held in the rivet-hole k' of the pipe-sections. After the rivet is in place the operator on the outside opens the air-inlet cock of the riveter or riveting-tool, so as to operate the hammer and cause the heading or upsetting of the rivet which projects through the rivet-hole. Upon the completion of the riveting or heading of one rivet the operator inside of the pipe receives another rivet, which is placed and held in the next rivet-hole, and the operator upon the outside moves or advances the slide-block or tool-holder to place the riveting-tool over such hole. The operation of heading or riveting is the same as that just described, which continues the entire circumference of the pipe or until all the rivet-holes of the circumferential seam have been closed. As the tool-holder approaches one of the lock-bars the same is released to permit the holder to move past the bar, after which the same is refastened.

Inasmuch as the present invention is designed for use in connection with the riveting the circumferential seam of pipe-section and not the longitudinal seam, it is not necessary that space be left below and around the pipe its entire length in order to fit the apparatus thereto, but only sufficient room or space be left at the end of the section to permit adjustment of the parts and allow the outside operator to pass around the pipe to guide and advance the riveting-tool as the work progresses. Upon the completion of the riveting of one circumferential seam the apparatus is taken apart and carried forward and adjusted around the pipe-section for the riveting of the next circumferential seam, the operator inside of the pipe likewise moving forward.

It will thus be noticed that the mechanical riveting may be successfully carried on at any distance from the starting-point, the only limitation being the length of the hose leading from the air-compressor inside of the pipe. However, this does not interfere with the work, for the compressor may be advanced as the work progresses. By the use of the present invention the circumferential seam of large water-pipe, such as is used for conduits, may be riveted in about forty-five minutes or even in less time, which permits the riveting of about eight hundred or more rivet-holes per day, as against two hundred per day

by handwork. Again, expert riveters are not required to do the riveting, which not only reduces the cost of joining the pipe-sections, but prevents delays incident to strikes.

As before stated, it is immaterial whether the riveting-tool be located inside or outside of the pipe-sections, and it is likewise immaterial whether the frame extend entirely around the pipe or only embrace a part of its diameter. Consequently wherever in the claims the word "tool-holder" is employed or "annular frame" I desire to be understood as meaning a holder for either the riveter or the rivet take-hold or a frame entirely embracing the pipe or only a part of its diameter.

Having thus described my invention, what I claim as new, and desire to secure protection for by Letters Patent, is—

1. In a device for use in connection with the work of riveting pipe, the combination of an annular frame adapted to be adjustably secured to the work to be riveted, a tool-holding block movable on said frame, and a riveting-tool carried by the block.

2. The combination with an annular frame adjustably held to the work to be riveted, of a tool-holding block slidably mounted upon the frame, a riveting-tool, carried by said block, and of a tool-supporter or take-hold with which the riveting-tool coacts during the operation of riveting.

3. The combination with the annular frame, of devices for securing and centering the same to the work to be riveted, of a tool-holding block slidably secured to and carried by the frame, and having a radial opening therein, and a tool secured in the opening.

4. The combination with the annular frame adapted to be rigidly held to the work to be riveted, of a tool-holding block slidably mounted upon the frame, said block carrying a riveting-tool, of a counterbalance attached to the slide-block to compensate for the combined weight of the block and tool, and of devices for adjusting and centering the frame to the work to be riveted.

5. The combination with a pipe-riveter, of an annular frame composed of independent members each member of which comprises a series of sections united together, and of a tool-holding block secured to and carried by said frame, said block adapted to be moved over the holes to be riveted so as to place the tool carried thereby in vertical alinement therewith.

6. In a holding device for use in connection with riveting the circumferential seam of pipe-sections, the combination with the rigid annular frame, of devices for attaching the same to the pipe to be riveted, of a tool-holding block secured on and carried by the frame, said block adapted to be moved around the pipe-seam, and of a tool-supporter located inside the pipe.

7. The combination with an annular frame or cincture, of devices for holding it upon the pipe-sections to be riveted, of a tool-holding block secured to and carried by the frame or cincture and capable of circumferential movement upon the pipe-sections to be riveted, said tool-holding block adapted to hold and carry a riveting-tool and place the same in vertical alinement with the holes to be riveted, and of a tool-supporter located inside of the pipe, said supporter carrying a tool with which the tool carried by the tool-holder coacts during the operation of riveting.

8. The combination with an outer annular frame, of devices for securing the same about the pipe-sections to be riveted, of a tool-holding block secured to and carried by the frame so as to have free movement transverse of the pipe, said holding-block adapted to carry a riveting-tool and place the same in vertical alinement with the holes to be riveted, and of a tool-supporter arranged within the pipe which carries a tool with which the tool of the holding-block coacts during the operation of riveting, said supporter having free circumferential movement correspondently with the movement of said tool-holder.

9. The combination with an annular frame or cincture for use in connection with riveting the circumferential seam of pipe-sections, of devices for securing the same around the pipe to be riveted and placing the frame in horizontal alinement with the pipe-sections, of a tool-holding block having circumferential movement secured to and carried by the frame, said block adapted to carry a riveting-tool, and of a supporter located within the pipe and carrying a tool with which the tool carried by the tool-holder coacts during the operation of riveting the pipe-sections.

10. In a holding device for use in mechanically riveting pipe-line work, the combination with an outer frame consisting of circular rings or bands, of devices for securing the same around the pipe-sections, the movable lock-bars which unite the rings at their top and hold the same an equidistance apart, of adjusting devices by means of which the rings are alined to the work, a tool-holder secured upon the frame so as to have free circumferential movement, said holder adapted to carry a riveting-tool, and of a tool-supporter arranged within the pipe and carrying a tool with which the tool carried by the tool-holder coacts during the operation of riveting.

11. In a holding device for use in connection with mechanically riveting the circumferential seam of pipe-sections, the combination with an annular frame, of a tool-holder movably secured thereto so as to have free movement circumferentially to the pipe-sections, said holder adapted to carry a riveting-tool and place the same in vertical alinement with the holes to be riveted, and of a tool-supporter arranged within the pipe and carrying a tool with which the tool carried by the tool-holder coacts during the operation of riveting.

12. The combination with an annular frame composed of two members, of the lock-bars

which hold the members together a distance apart, of adjusting devices by means of which alinement of the frame is secured, a tool-holder slidably mounted upon the frame, said holder adapted to carry a riveting-tool, a counterbalance-weight connected to said tool-holder so as to compensate for the combined weight of the holder and tool, and of a tool-supporter for use inside the pipe, said supporter carrying a tool with which the tool of the holder coacts during the operation of riveting.

In testimony whereof I affix my signature, in presence of two witnesses, this 10th day of June, 1898.

ROBERT S. MOORE.

Witnesses:
N. A. ACKER,
LEE D. CRAIG.