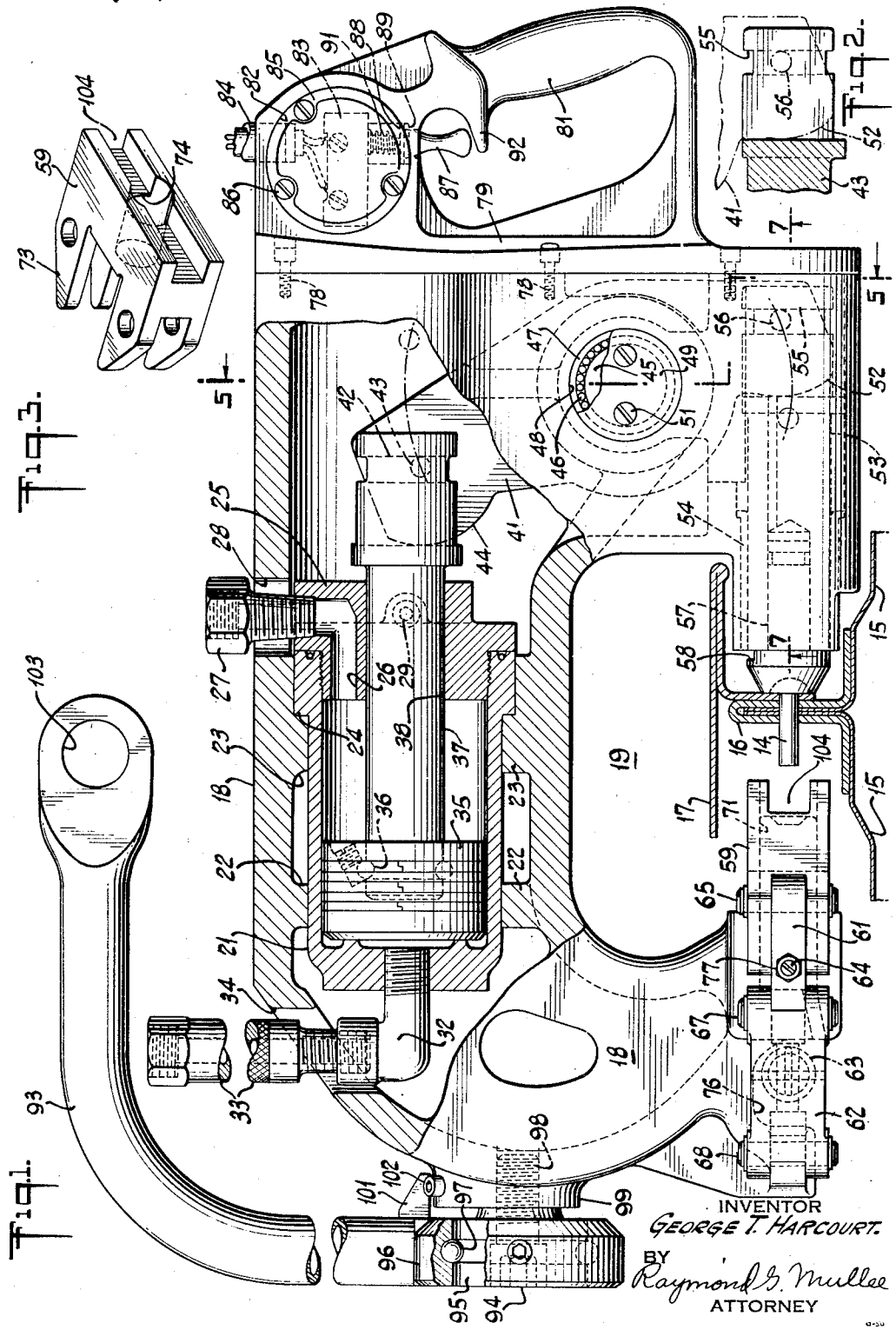
Jan. 30, 1951 G. T. HARCOURT 2,539,419

PRESSURE PAD FOR RIVETING MACHINES

Filed May 11, 1948 3 Sheets-Sheet 1



INVENTOR
GEORGE T. HARCOURT.
BY
Raymond B. Mullee
ATTORNEY

Jan. 30, 1951 G. T. HARCOURT 2,539,419

PRESSURE PAD FOR RIVETING MACHINES

Filed May 11, 1948 3 Sheets-Sheet 2

Fig. 4.

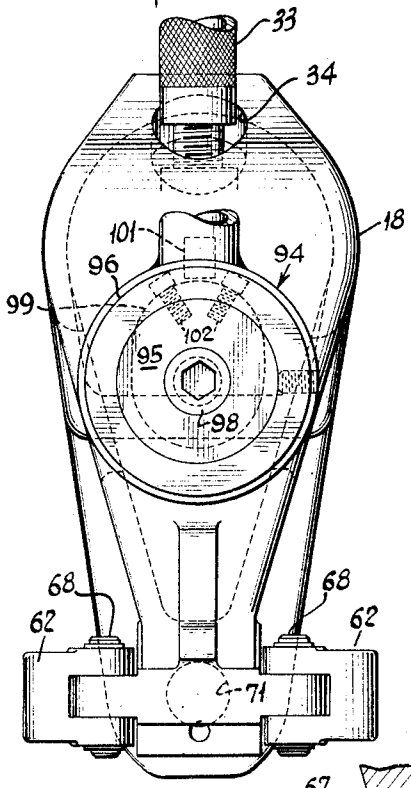


Fig. 5.

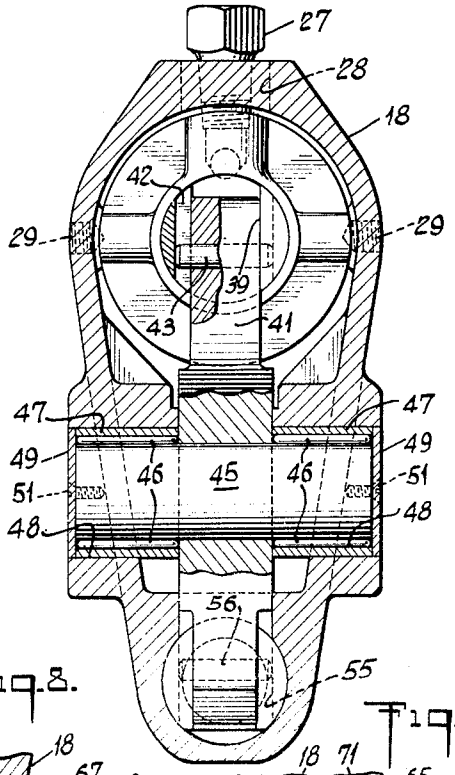


Fig. 8.

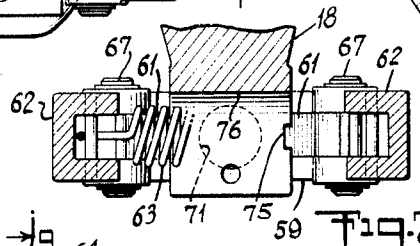


Fig. 9.

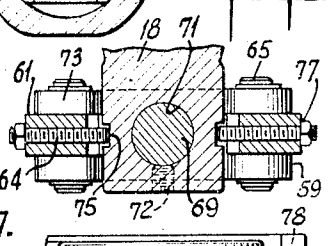


Fig. 6.

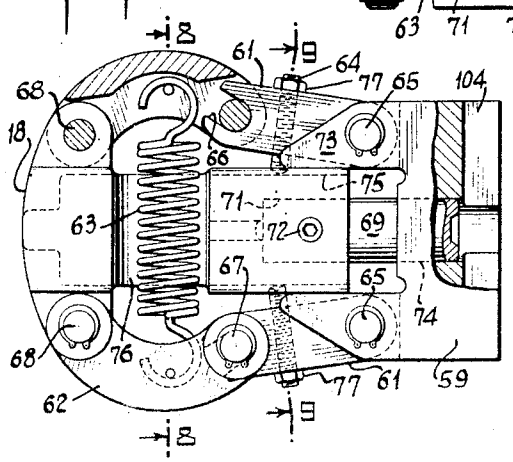
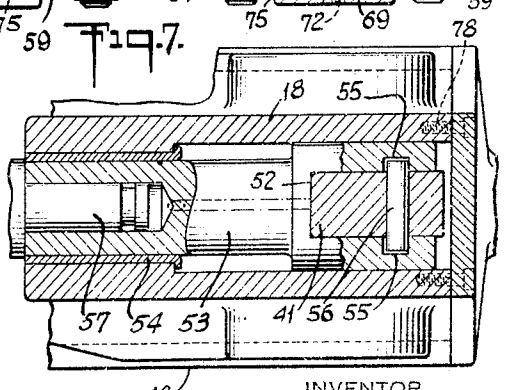


Fig. 7.



INVENTOR
GEORGE T. HARCOURT.
BY
Raymond G. Mullee
ATTORNEY

Jan. 30, 1951 G. T. HARCOURT 2,539,419

PRESSURE PAD FOR RIVETING MACHINES

Filed May 11, 1943 3 Sheets-Sheet 3

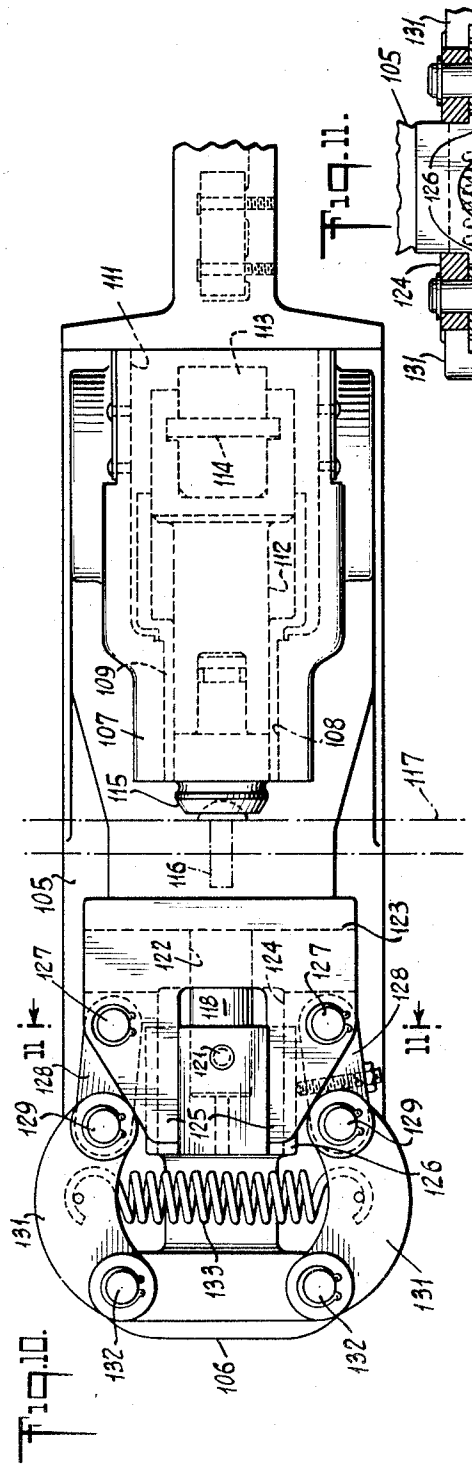


Fig. 10.

Fig. 11.

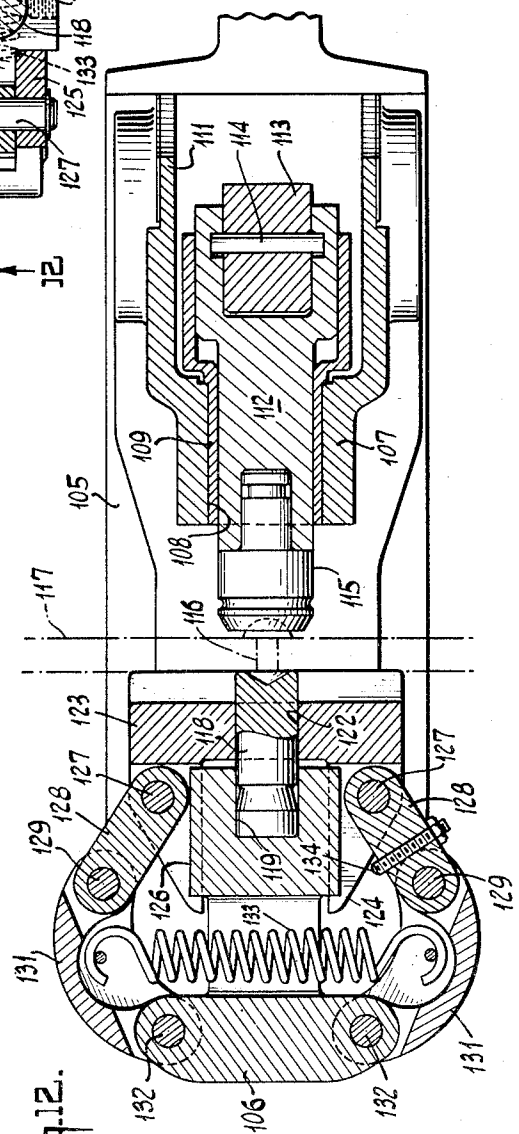


Fig. 12.

INVENTOR
GEORGE T. HARCOURT.
BY
Raymond H. Mullee
ATTORNEY

Patented Jan. 30, 1951

2,539,419

UNITED STATES PATENT OFFICE

2,539,419

PRESSURE PAD FOR RIVETING MACHINES

George T. Harcourt, Detroit, Mich.

Application May 11, 1948, Serial No. 26,296

6 Claims. (Cl. 78—52)

1

This invention relates to portable riveting tools and more particularly to a portable hydraulic riveter which is especially useful for seam cap riveting operations.

Seam cap riveting is illustrated for example in the United States Patent 2,085,540, issued June 29, 1937, to Walter P. Murphy, and which concerns a roof construction for metal freight cars. In seam cap riveting it is essential that the folds of metal which comprise the seam cap assembly, must be securely clamped prior to and during the riveting operation if a good rivet setting is to be achieved. In the Murphy car roof seam cap little space is afforded for clamping, and in addition thereto, brackets for the car running board which are sometimes riveted with the seam cap, further complicates the riveting operation.

It is the object of this invention to provide a portable hydraulic riveter which can be conveniently used by an operator to efficiently rivet a seam cap such as is incorporated in a Murphy car roof construction.

A further object is to provide a portable hydraulic riveter having a universal type suspension means whereby the riveter can be easily and quickly positioned for riveting operations.

Another object is to provide a hydraulic riveter having an adjustable pad for clamping the work prior to and during the rivet setting operation. A feature of the invention is a toggle link arrangement interposed between the pressure pad and yoke and so arranged that the reaction of the yoke to the pressure against the rivet set is at first transmitted entirely to the pressure pad to clamp the work pieces firmly together, and later with a decreasing component of reactive force taken by the pad with a correspondingly increasing portion taken by the dolly to head the rivet.

Further objects of the invention are to provide a hydraulic riveter which is compact in structure, reliable in operation, easy to manipulate and which is extremely serviceable and has low maintenance costs.

These and further objects and features of the invention will become apparent when viewed in the light of the following specification and accompanying drawings wherein:

Fig. 1 is a side elevation, partly in section, of a portable hydraulic riveter, according to one embodiment of the invention;

Fig. 2 is a fragmentary longitudinal section of the slotted rear end of the ram or rivet set holder,

2

showing in broken lines a part of the rocket arm which actuates the holder;

Fig. 3 is a perspective view of the pressure pad;

Fig. 4 is a front end view of the riveter shown in Fig. 1, as seen from the left thereof;

Fig. 5 is a cross section along the irregular line 5—5 in Fig. 1;

Fig. 6 is a bottom view, partly in section, of the pressure pad portion of the tool shown in Fig. 1;

Fig. 7 is a longitudinal section of a portion of the riveter as seen along line 7—7 in Fig. 1, looking upward;

Fig. 8 is a cross section through the depending portion of the yoke and the rear toggle links, as indicated by the arrows 8 in Fig. 6;

Fig. 9 is a cross section through the depending portion of the yoke, the front toggle links and the pressure pad extensions as indicated by the arrows 9 in Fig. 6;

Fig. 10 is a bottom plan view of a modified riveter, showing the parts of the tool in their normal or inoperative position relative to the work which is indicated in broken lines;

Fig. 11 is a cross section as indicated by the arrows 11 in Fig. 10 showing the depending portion of the yoke, the dolly, the pressure pad extensions, toggle links and pivot pins; and

Fig. 12 is a longitudinal section looking upward as indicated by the arrows 12 in Fig. 11, showing the riveter of Fig. 10 in relation to the work (in broken lines) at the completion of the riveting operation.

Referring to Fig. 1, the material operated upon by the present riveter comprises a rivet 14 extending horizontally through the flanged ends of two adjacent roof sheets 15 and through a seam cap 16 of generally inverted U shape which snugly embraces said flanged ends. The seam cap 16 extends transversely of the roof of the car, at a slight inclination to the horizontal, and near the center of the roof it serves as a support for the running board bracket 17. The riveter of this invention is designed to press the front and rear folds of the seam cap into tight contact with the roof sheet flanges and then head the rivet with a squeezing action. The head of the rivet 14 may engage the seam cap directly or may be separated therefrom by a flange of bracket 17 as shown, depending upon the location of the riveting operation. The present invention, therefore, is designed to permit variations in the length of the rivet and in the total thickness of the work pieces.

A yoke 18 is arranged to house or support

the various elements of the riveter. Yoke 18 is preferably in the form of a steel casting which is generally hollow, the walls of the yoke being of such thickness as to provide minimum weight and maximum strength, in accordance with well recognized principles of design. The bay 19 of the yoke 18 is arranged to provide sufficient clearance for the work, and permit the riveter to be moved both swivelly and longitudinally relative to bracket 17.

Within the upper portion of the yoke 18 is an open-ended cylinder 21 which is positionally maintained by means of a press fit to circumferential projections 22 and 23 formed on the inner walls of the yoke 18. A shoulder 24 on the exterior of the cylinder 21 in the region of the open end abuts against projection 23 to restrict forward movement of the cylinder 21 within the yoke 18. Threadably affixed to the open end of the cylinder 21 is a cylinder head 25 in which is arranged a passageway 26, one end of which opens into the cylinder 21 the other end of which is threaded for the reception of a pipe coupling 27, which is arranged to project into an opening 28 in the top wall of the yoke 18. The cylinder head 25 is locked in position by means of two set screws 29 which pass through opposite walls of the yoke 18 and engage the cylinder head as shown. The closed end of the cylinder 21 has an opening 31 which is threaded to receive a street elbow 32 in which is screwed a grip coupling 33, which passes through an opening 34 in the top wall of the yoke 18, the grip coupling 33 being approximately in line with the coupling 27. Within the cylinder 21 is slidably arranged a piston 35 which is secured, by means of a ball connection 36, to a piston rod 37 which passes through a smooth fitting bore 38 in the cylinder head 25.

The end of the piston rod 37 which projects from the cylinder 21 beyond the cylinder head 25, is enlarged and bifurcated by means of vertical slot 39 (Fig. 5) which receives the upper end of a rocker arm 41 enclosed within the yoke 18. On opposite sides of the slot 39 are located two vertical grooves 42 which are arranged to receive the ends of a pin 43, retained in the upper end of the rocker arm 41. It is to be noted that the width of the grooves 42 is somewhat greater than the diameter of the pin 43, and that the pin engages the rear side of the groove. The pin 43 serves to transmit return stroke movement of the piston 35 to the rocker arm, and such a groove and pin arrangement insures that no strain is caused the pin 43 during power stroke movement of the rocker arm 41. The upper end of the rocker arm 41 has a curved projection 44 which abuts against the bottom of slot 39 on the piston rod 37 during the power stroke thereof.

The rocker arm 41 pivots about its central portion by means of a transverse pin 45, each end of which is maintained in needle bearings 46, which are surrounded by a bushing 47, the bushing being press-fitted to a bore 48 formed in the wall of the yoke 18. At each end of the pin 45 is a plate 49 which is secured by a screw 51 to the end of the pin 45 and which restricts lateral movement of the needle bearings 46, the plate fitting within the bore 48 as shown.

The lower end of the rocker arm 41 has a curved projection 52 (Figs. 1 and 2) which abuts against a ram or rivet set holder 53 slidably arranged in a bushing 54 (Fig. 7) which is press-fitted to a bore in the rear jaw of the yoke 18. The end of the holder 53 which engages the rocker arm 41 is bifurcated, and two vertical grooves 55 are arranged on opposite inner surfaces of the bifurcated end, to receive the ends of a pin 56 retained in the lower end of the rocker arm 41. The pin 56 and groove 55 arrangement serves the purpose of transmitting return stroke movement from the rocker arm 41 to the holder 53, and is similar to the arrangement of pin 43 in grooves 42, so that no strain is caused pin 56 during power stroke movement of rocker arm 41. The axis of pivot pin 45 is closer to the axis of ram 53 than to the axis of power piston 35 in order to multiply the force of the piston in a well known manner. A rivet set 57 is snugly fitted to a bore in the holder 53, the rivet set 57 being conveniently removed when worn or when different size and style rivets are to be set, by means of a shoulder 58 (Fig. 1) formed on the external periphery of the rivet set and against which can be driven a wedge to force the rivet set 57 from the holder 53.

On the forward jaw of the yoke 18 and opposite the rivet set 57, is a pressure pad arrangement, which is best seen in Fig. 6. The pressure pad arrangement comprises a pressure pad 59 (Fig. 3) and a spring actuated toggle lever system consisting of a pair of front links 61, a pair of rear links 62, a pre-loaded tension spring 63, and adjustment screws 64 (Figs. 6 and 9) which pass through the links 61 and are threadably associated therewith. The front links 61 are connected by pins 65 to the pressure pad 59 at one end, and each has an open end slot 66 at the other end which engages a pin 67 in one end of the rear links 62, the other end of the links 62 being connected by pins 68 to ears on the yoke 18, as shown. A dolly 69, one end of which is snugly fitted to a bore 71 in the forward jaw of the yoke 18 and locked therein by set screw 72, extends from the yoke 18 along a center line coinciding with the center line of the rivet set 57 in the opposite jaw of the yoke 18. The pressure pad 59 has a pair of parallel sided extensions 73 which are arranged to slidingly engage flat lateral surfaces of the yoke jaw, and a centrally positioned bore 74 which serves for the reception of dolly 69. The pressure pad 59 is thus arranged for reciprocal motion to and from the rear yoke jaw in a fixed plane. Horizontal grooves 75 in the sides of the forward yoke jaw receive the ends of screws 64 as shown in Fig. 9, thus assisting in holding the pressure pad and toggle assembly in proper alinement. The spring 63 passes through a recess 76 formed in the bottom of the yoke jaw, the spring connecting at each end with a rear link 62 to urge the links toward each other.

It is to be noted that the three pins 65, 67, 68, used for connecting one side of the pressure pad arrangement are not in a straight line, the center pin 67 being at the greatest distance from the center of the yoke 18. Thus when the pressure pad 59 is forced rearwardly in the direction of the spring 63, each of the two rear links 62 pivot about the fixed pins 68 and swing out, thereby further tensioning the spring 63. The amount of force required to initially overcome the resistance of the spring 63 depends upon the distance of the center pin 67 from a line drawn through the center of the other two pins 65 and 68. The greater this distance, the greater will be the mechanical advantage and the less will be the force required to move the pressure pad 59 rearward. The adjustment screws 64 maintain the center pins 67 at the proper distance

from the center of the yoke to obtain the desired initial pressure of the pressure pad. Each adjustment screw 64 is provided with a lock nut 77 to maintain the setting of the adjustment screw. It is apparent that the pressure pad arrangement is so arranged as to provide maximum clamping pressure of the work prior to and at the commencement of the riveting operations, followed by an automatic decreasing in pressure so that at the time the rivet upsetting begins, most of the power of the work cylinder which was applied to overcome the resistance of the pressure pad, is applied to upsetting the rivet.

Affixed to the rear end of the yoke 18 by screws 78 is a cover 79 (Fig. 1), which preferably is in the form of a casting, and which incorporates a handle portion 81 and a switch box cavity 82. Within the switch box cavity 82 is secured an electrical switch 83 of the plunger type and having single throw normally open contacts. An electrical conduit 84, connected to the switch 83, passes upwards through the top wall of cavity 82. A cover plate 85 encloses the switch box cavity 82 and is positionally retained by screws 86 as shown in Fig. 1. Projecting from the lower portion of the cavity 82 is a trigger 87 having a shoulder 88 which rests upon a circumferential ledge 89 located in a hole extending downwardly from the cavity 82. A spring 91 bears against the shoulder 88 of the trigger 87 to maintain the trigger in off or non-operative position; however, the trigger can be manually cocked so that the shoulder will rise to engage the plunger of the switch 83 and thereby close the switch contacts. A trigger guard in the form of a projection 92 is arranged on the inner surface of the handle 81 just below the trigger 87, to isolate the trigger and impede accidental manipulation thereof.

The riveter is suspended by a bail 93 which is connected at one end to the front of the yoke 18 by means of a trunnion arrangement 94. The trunnion arrangement 94 comprises a hub 95, a sleeve 96 which surrounds the hub, and a plurality of ball bearings 97 which are maintained in a pair of complementary raceways in the hub and sleeve respectively. The bail 93 is secured to the sleeve 96 by suitable means such as welding for example. A cap screw 98 tightly screws the hub 95 to a boss 99 located on the front end of the yoke 18. Projecting from the trunnion arrangement 94 and extending about the top of the boss 99 is an arm 101 which operatively abuts against either of two screws 102 in the boss 99, thus serving as a stop to limit the amount of swivel movement of the trunnion. The bail 93 extends in a direction over the riveter and terminates at a point above the center of gravity thereof. A transverse bore 103 is provided at the free end of the bail, the bore forming an eyelet adapted to receive the hook of a balancer or hoist (not shown). It is thus seen that the riveter is suspended in such manner that it may readily be moved from one position to another and may swivel to accommodate itself itself to the different angles of the car roof.

The riveter is hydraulically operated by a standard two-way hydraulic power plant (not shown). The couplings 27 and 33 are connected by hose means, not shown, to the power plant. Conduit 84, which is connected at one end to the switch 83, connects at the other end to electrical control means of the power plant, the electrical control means being so arranged as to initiate the hydraulic cycle of the power plant. When the trigger 87 is operated to close the electrical contacts of switch 83, the electrical control means of the power plant respond to set into operation a pumping cycle whereby high pressure oil is supplied to the high pressure hose connected to coupling 33, thereby forcing the piston 35 rearward in cylinder 21, thus commencing a rivet setting operation. After the rivet has been headed and a predetermined pressure is reached within the cylinder, the power plant automatically reverses its cycle (in response to the back pressure of oil in the high pressure hose connected to coupling 33) and pumps low pressure oil through the hose connected to coupling 27 while exhausting the high pressure hose, until the piston 35 has returned to first position, after which the operation of the power plant automatically ceases. Upon release of the trigger 87 and the reactuation thereof, the power plant repeats the cycle as above set forth.

In operation the riveter shown in Figs. 1–9, is positioned so that the rivet set 57 contacts the head of the rivet which is located in a hole in the work piece, the other end of the rivet extending through the work piece in the direction of the pressure pad 59 as shown in Fig. 1. The trigger 87 is pressed initiating operation of the power plant and resulting in pressurized oil being delivered to the cylinder from the hose connected to coupling 33. The piston 35 is forced rearwardly in the cylinder 21 causing the rocker arm 41 to be rotated clockwise about the pin 45 thereby tending to drive the rivet set holder 53 forward, or in the direction of the opposite jaw of yoke 18. However, since the holder 53 abuts against the work piece by way of rivet set 57, the work piece being stationary prevents forward movement of the rivet set holder 53, with the result that the motion is transferred to the yoke 18, which thereupon moves in a rearward direction in unison with the pressure pad 59 causing the latter to engage the work piece, or the seam cap assembly as is illustrated. Continued movement of the yoke 18 causes the pressure pad 59 to tightly squeeze the work piece until the dolly 69 moves rearward relative to the pressure pad and contacts the rivet. The operator then observes through the transverse slot 104 in the pressure pad 59 whether or not the dolly 69 and rivet 14 are properly alined, releasing the trigger 87 if necessary to prevent misoperation. If the trigger is kept pressed, the oil pressure and mechanical pressure build up rapidly and the rivet heading operation begins, but the pressure of the pad 59 is gradually diminished as the mechanical advantage of the link toggle system increases, in the manner as heretofore explained.

When the rivet heading is completed and the piston 35 has travelled its maximum distance, the pressure in the high pressure delivery hose builds up to such a value as to automatically reverse the operating cycle of the power plant, whereupon the oil in the high pressure hose is released and low pressure oil is delivered to the cylinder 21 by way of the hose connected to the coupling 27, thereby forcing the piston 35 to return to its first position in the cylinder. In so doing, the rocker arm 41 is moved in counter-clockwise direction thus causing the return of the rivet set holder 53 and the pressure pad arrangement to initial position so that the riveter can be removed for positioning for subsequent riveting operations.

Referring now to Figs. 10, 11 and 12, the modified riveter comprises a yoke 105 having a front jaw 106 and a rear jaw 107. The rear jaw has a

longitudinal bore 108 receiving with a press fit a cylinder liner 109 and has a counterbore 111 surrounding an enlarged diameter portion of the liner. A two-diameter ram or rivet set holder 112 is slidably fitted to the liner. Any suitable means may be provided for actuating the ram forwardly relative to the cylinder liner on its power stroke and for returning it, for example a rocker arm 113 and pin 114 connection similar to the arrangement of Figs. 1 and 2. The front end of the ram is bored to receive a detachable rivet set 115 engageable with the head of a rivet 116 mounted in a set of sheets 117.

Engageable with the shank end of the rivet 116 is the rear extremity of a dolly 118 whose front end fits within a bore 119 in yoke jaw 106, being retained by set screw 121. Dolly 118 has a sliding fit in a bore 122 in the body portion of a pressure pad 123. The pressure pad is arranged to press the work pieces 117 tightly against the rivet set 115 in the manner of the pressure pad 59 shown in Fig. 3. It has an upper pair of flanges 124 projecting forwardly from the body portion, the inner edges of the fingers slidably fitting the sides of a depending portion of front jaw 106. It has a lower pair of fingers 125 of greater width than the upper pair, similarly engaging a narrower part of the jaw near the lower extremity of the latter. The jaw 106 has a pair of ribs 126 extending between the upper and lower fingers and fitting the latter to provide a track which guides the pressure pad in its sliding movement relative to the yoke. Extending vertically on opposite sides of the yoke jaw 106 is a pair of pins 127 each supported by pressure pad fingers 124 and 125 and providing a pivot for the rear end of rear link 128. The front end of each link 128 is pivotally connected by vertical pin 129 to a front link 131. The front links in turn are pivoted, by pins 132, to the front jaw 106 on yoke 105. A tension spring 133 connects the two front links and tends to pull the intermediate pivot pins 129 toward each other at all times. In the normal or non-operative condition of the parts the inward collapsing movement of the links is limited by a screw 134 extending transversely through one of the rear links 128, the inner end of the screw abutting against the associated rib 126 on yoke jaw 106. The links 128 and 131 cooperate with the spring 133 and screw 134 to provide a toggle connection between the pressure pad 123 and yoke 105 operating in a similar manner to the toggle of Fig. 5.

In operation, the entire riveting tool is moved until the rivet set 115 engages the head of rivet 116. The power is turned on, and the rocker arm 113 is actuated to urge the ram 112 forward and the yoke 105 rearward. Since the ram is held against movement by the rivet 116 and stationary work pieces 117, the entire yoke 105 moves back carrying with it the front jaw 106 and the dolly 118 and also during the initial movement of the yoke, the pressure pad 123. The latter comes into contact with the sheets 117 pressing them firmly against the head of rivet 116, which is backed up by rivet set 115. Thereafter, continued movement of the yoke 105 in a rearward direction is accompanied by continued movement of the dolly 118 but not the pressure pad 123. The relative movement between the yoke and pressure pad spreads the pivot pins 129 apart, as above described in connection with Fig. 6, and gradually relieves the yoke of the opposition to movement offered by the pressure pad and toggle assembly, while the component of force transmitted through the dolly increases. Continued movement of the dolly 118 relative to the pressure pad 123 heads the rivet until the parts finally come to rest as shown in Fig. 12.

It is thus apparent that the power stroke of the riveter includes four stages: first, the unopposed movement in unison of yoke jaw 106, dolly 118 and pressure pad 123, which stage terminates when pressure pad contacts work sheets 117; second, the movement of the pressure pad (substantially in unison with the yoke and dolly) for a slight distance to compress the work sheets, which stage ends with the pressure pad coming to rest; third, the movement of the yoke and dolly relative to the pressure pad, under the decreasing force of opposition of the toggle alone, which stage ends when the dolly contacts the rivet; and fourth, the movement of the yoke and dolly against the resistance of the rivet being headed and also against the (further decreasing) resistance of the toggle.

The set screw 134 should be adjusted to permit the pressure pad 123 to firmly engage the work sheets 117 just before the dolly 118 engages the shank end of rivet 116, or in other words to minimize the length of stroke in the third stage, by making the first, or unopposed stage continue as long as possible. If the screw is tightened too much, that is, if it is projected too far inwardly, it will hold the pressure pad 123 out of contact with the work pieces 117 until after the dolly 118 and rivet set 115 have started to head the rivet and thus fail to insure a tight connection; or in other words, it will delay the second stage and make it overlap the fourth. If the screw is too loose it will shorten the first stage and cause the pressure pad to start functioning sooner than necessary, thereby resulting in a waste of power and increased wear and breakage as the spring 133 is repeatedly tensioned and untensioned.

The setting of the screw 134 may be retained for successive riveting operations as long as there is no variation in the structure of the workpieces or the distance that the shank end of the rivet 116 projects beyond the work sheets 117. Variations caused by the successive inclusion and omission of a running board bracket 17 (Fig. 1), may be compensated for by the use of rivets of corresponding length, without requiring a resetting of adjusting screw. On the other hand, an increase in the thickness of the sheet metal which forms the seam cap would call for a change in the adjustment of the screw because it would require a greater initial clamping pressure to squeeze the assembly together prior to riveting. In that case, the set screw 134 is loosened to permit the intermediate pins 129 to come somewhat closer together and the pressure pad 123 to shift slightly further to the right as compared with Fig. 10. When the power is applied there will be a slightly shorter stroke than usual in the first stage resulting in a correspondingly longer stroke in the third stage. At the time the fourth stage begins the pressure on pad 123 will have diminished considerably below the maximum but will still be effective to hold the workpieces in snug engagement. A slight lengthening or shortening of the stroke in the first stage caused by a change in the setting of screw 134 results in a very great change in the initial mechanical advance of the toggle and the initial (but not the final) pressure on the pad 123.

What is claimed is:

1. A pressure pad arrangement comprising a pad support, a pressure pad element having a

pair of parallel sided extensions which slidingly engage the sides of the pad support, a pair of rear links symmetrically disposed about said pad support, the rear end of said links being pivotally connected to said pad support, a pair of front links each of which interconnects a rear link and a parallel sided extension of said pressure pad element, and a preloaded tension spring, each end of which connects to a rear link to draw said rear links together.

2. A pressure pad arrangement according to claim 1, means to adjust the amount of preloading of said spring, said means comprising a screw which is threadably associated with a front link to adjustably project therefrom and abut against the side of said support, a lock nut on the adjustment screw and arranged so that it can be turned into abutment against the side of the link.

3. A pressure pad arrangement comprising a pad support, a pressure pad element adapted to engage the work pieces slidably connected to the pad support, said pressure pad element having a through opening, said pad support adapted to carry a dolly to extend through the through opening of the pressure pad element, a pair of rear links symmetrically disposed about the pad support, and the rear ends of said links being pivotally connected to the pad support, a pair of front links and each of which is pivotally connected to a rear link and to the pressure pad element, and a preloaded tension spring connected between the said rear links to draw the links together.

4. A pressure pad arrangement comprising a pad support, a pressure pad element adapted to engage the work pieces slidably connected to the pad support, said pressure pad element having a through opening, said pad support adapted to carry a dolly to extend through the through opening of the pressure pad element, a pair of rear links symmetrically disposed about the pad support, and the rear ends of said links being pivotally connected to the pad support, a pair of front links and each of which is pivotally connected to a rear link and to the pressure pad element, and a preloaded tension spring connected between the said rear links to draw the links together, said pad support having grooves in the respective opposite sides of the same, an adjusting screw connected to each of the front links and adjustable to regulate the amount of preloading of the spring, said adjusting screws engaging respectively with the grooves of the pad support.

5. A pressure pad arrangement comprising a pad support, a pressure pad element adapted to engage the work pieces slidably connected to the pad support, said pressure pad element having a through opening, said pad support adapted to carry a dolly to extend through the through opening of the pressure pad element, a pair of rear links symmetrically disposed about the pad support, and the rear ends of said links being pivotally connected to the pad support, a pair of front links and each of which is pivotally connected to a rear link and to the pressure pad element, and a preloaded tension spring connected between the said rear links to draw the links together, said pressure pad element having a pair of spaced parallel sided extensions lying on the opposite sides of the pad support, said pad support having ribs lying respectively at the opposite sides thereof, said parallel extensions of the pressure pad element lying respectively on the opposit sides of a rib whereby to be guided by the same.

6. A pressure pad arrangement comprising a pad support, a pressure pad element adapted to engage the work pieces slidably connected to the pad support, said pressure pad element having a through opening, said pad support adapted to carry a dolly to extend through the through opening of the pressure pad element, a pair of rear links symmetrically disposed about the pad support, and the rear ends of said links being pivotally connected to the pad support, a pair of front links and each of which is pivotally connected to a rear link and to the pressure pad element, and a preloaded tension spring connected between the said rear links to draw the links together, said pressure pad element having a pair of spaced parallel sided extensions lying on the opposite sides of the pad support, said pad support having ribs lying respectively at the opposite sides thereof, said parallel extensions of the pressure pad element lying respectively on the opposite sides of a rib whereby to be guided by the same, said front links being pivotally connected with the parallel sided extensions, each link lying between the respective side extension of a pair, and an adjusting screw adjustable in one of the front links and engageable with a rib whereby to predetermine the amount of loading of the tension spring.

GEORGE T. HARCOURT.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
493,928	Heyde	Mar. 21, 1893
1,930,181	Bodden	Nov. 13, 1934
2,053,717	Huck	Sept. 8, 1936
2,384,175	Kaman	Sept. 4, 1945
2,387,449	Kaman	Oct. 23, 1945