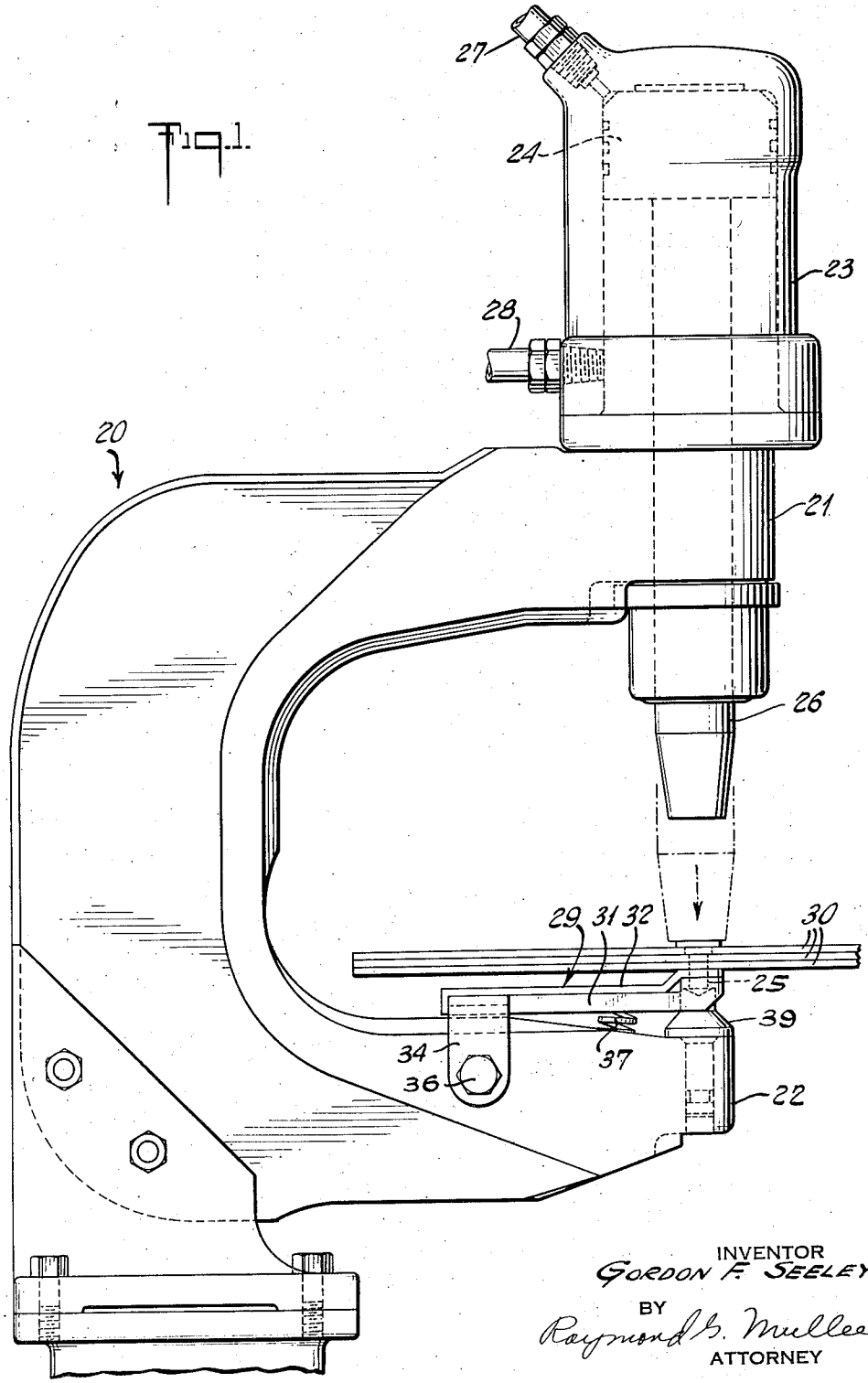
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RIVET GUIDE AND PRESSURE PAD ASSEMBLY

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Fig. 1.



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Fig. 2.

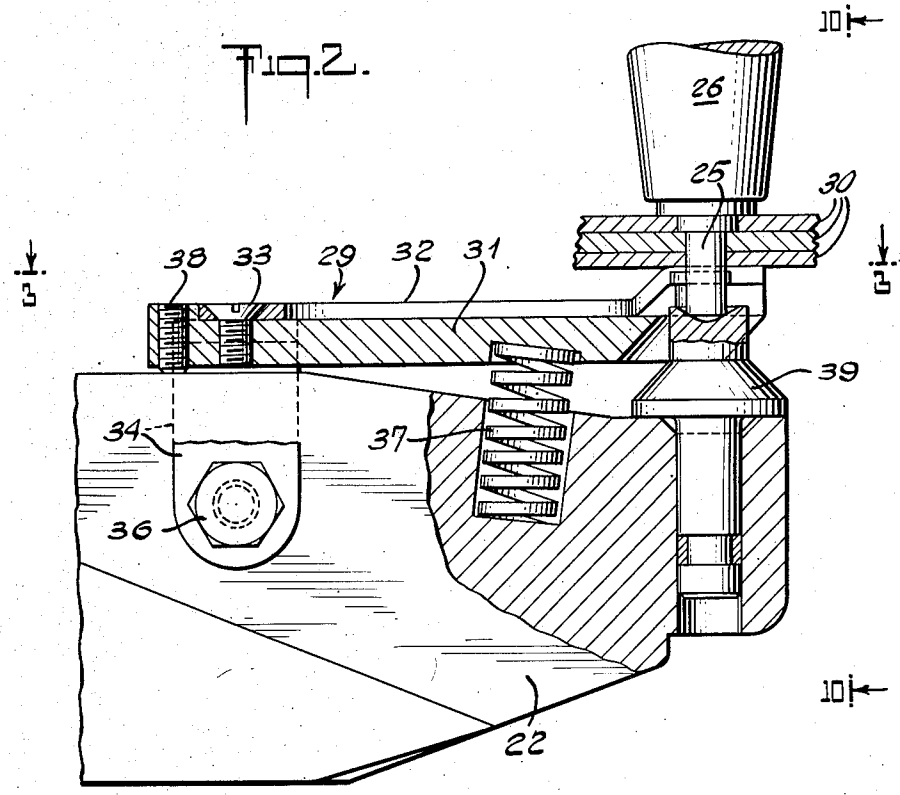
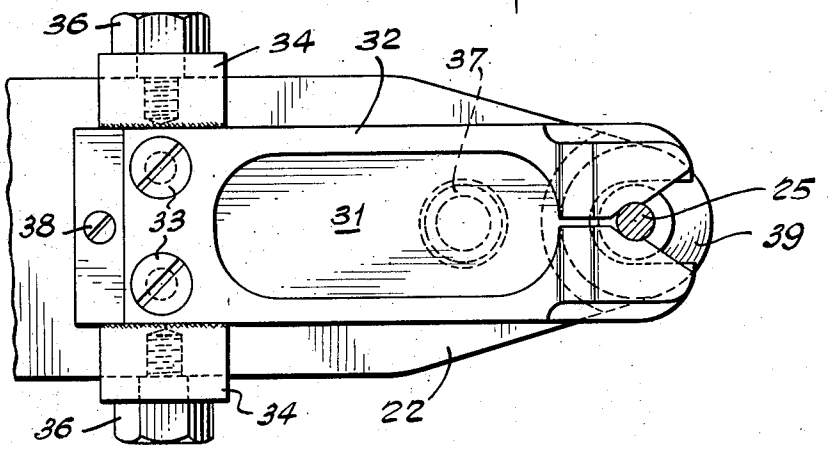


Fig. 3.



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Fig. 4.

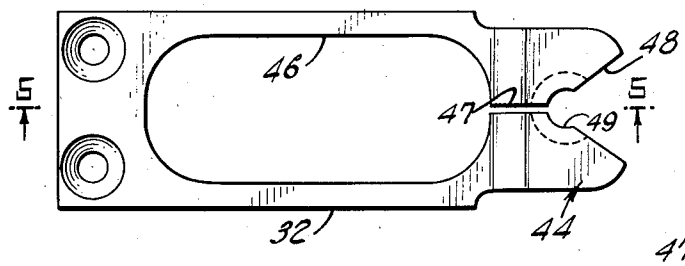


Fig. 6.

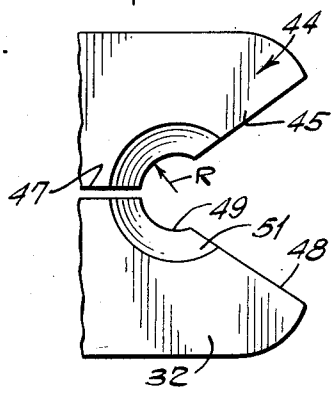


Fig. 5.

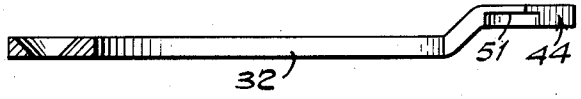


Fig. 7.

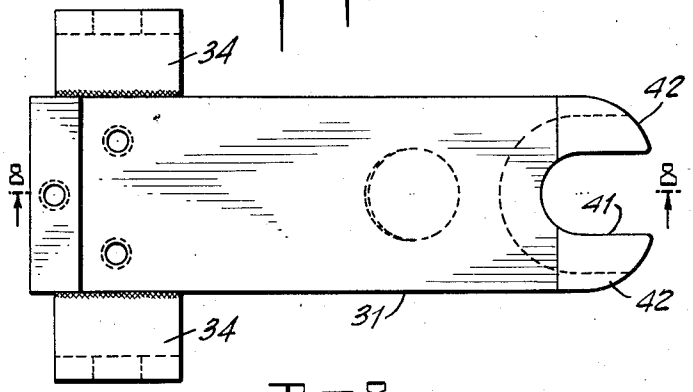


Fig. 9.

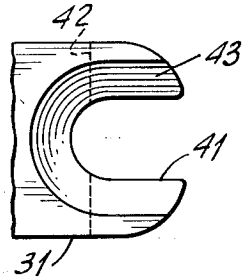
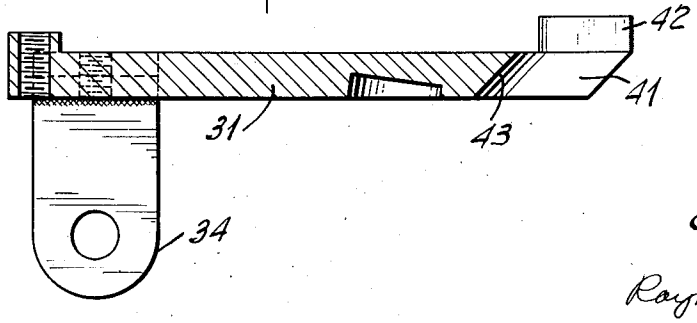


Fig. 8.

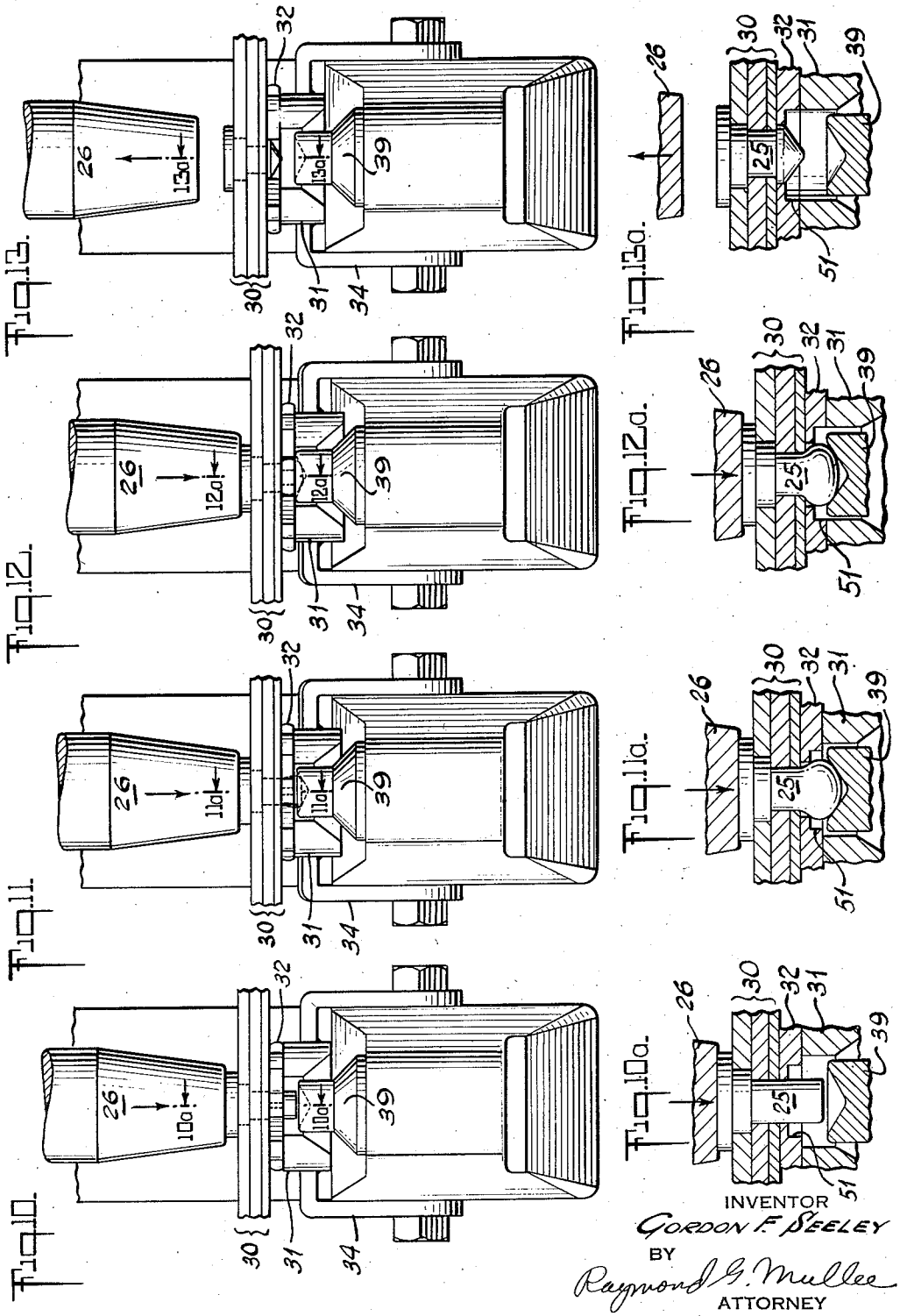


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RIVET GUIDE AND PRESSURE PAD ASSEMBLY

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RIVET GUIDE AND PRESSURE PAD ASSEMBLY

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Application December 2, 1952, Serial No. 323,619

6 Claims. (Cl. 78—52)

This invention relates to a rivet guide and pressure pad assembly for a riveting machine.

In riveting operations, particularly when the work consists of large sheets, it is often difficult to align the rivet with the rivet dolly prior to heading the rivet, since the rivet dolly is obscured by the sheets. Much time can be spent by the operator in making certain that there is proper alignment, and he is subject to error due to haste, or misjudgment, which renders the riveting operations inefficient and accordingly costly. Furthermore, in the riveting together of stacked sheets, it is important that the sheets be firmly pressed together during the riveting operation so that the rivet is properly set, and to prevent spreading out of the rivet between the sheets, the latter which may occur in squeeze riveting operations.

Briefly, the subject invention comprises an assembly, including a rivet guide means which provides for the rapid and convenient alignment of the rivet in a work sheet over the rivet dolly, and a pressure pad means which assures that the work sheets are firmly held together during the riveting operation.

The object of this invention is to provide a means to assure proper alignment of a rivet with a rivet dolly prior to rivet heading.

Another object is to provide a means whereby the work on which the riveting operations are being performed is firmly held together during the riveting operation.

A further object is to provide an assembly including a rivet guide means and pressure pad means which can be easily attached to a riveting machine, which is simple in structure, reliable in operation, of low initial and maintenance cost, and which will improve the efficiency of riveting operations, particularly when working on large sheets.

These and further objects of the invention will become more apparent from the following specification and the relative drawings, wherein:

Fig. 1 is a partial view of a stationary riveting machine, showing an embodiment of the subject invention, as applied thereto;

Fig. 2 is a sectional view of the subject invention as attached to the riveting machine, and at twice the scale as shown in Fig. 1;

Fig. 3 is a plan view as seen from line 3—3 of Fig. 2;

Fig. 4 is a plan view of a rivet guide element shown in Fig. 2;

Fig. 5 is a sectional view of the rivet guide element as seen from line 5—5 in Fig. 4;

Fig. 6 is a fragmentary plan view of the underside of the end of the rivet guide element, and at twice the scale as shown in Fig. 4;

Fig. 7 is a plan view of a pressure pad element as shown in Fig. 2;

Fig. 8 is a sectional view of the pressure pad element as seen from line 8—8 in Fig. 7;

Fig. 9 is a fragmentary plan view of the underside of the end of the pressure pad element as shown in Fig. 7;

Fig. 10 is an end view as seen from line 10—10 of

Fig. 2, and showing conditions existing after rivet alignment with the rivet dolly and just prior to commencement of the rivet heading operation;

Fig. 10*a* is a sectional view as seen from line 10*a*—10*a* of Fig. 10, and at approximately one-and-a-half times the scale of Fig. 10;

Fig. 11 is an end view similar to Fig. 10, but showing the conditions existing at an early stage in the rivet heading operation;

Fig. 11*a* is a sectional view as seen from line 11*a*—11*a* of Fig. 11, and at approximately one-and-a-half times the scale of Fig. 11;

Fig. 12 is an end view similar to Fig. 10, but showing the conditions existing at a late stage in the rivet heading operation;

Fig. 12*a* is a sectional view as seen from line 12*a*—12*a*, of Fig. 12, and at approximately one-and-a-half times the scale of Fig. 12;

Fig. 13 is an end view similar to Fig. 10, but showing the conditions existing at the completion of the rivet heading operation, and with the riveting machine plunger being retracted and out of engagement with the rivet; and

Fig. 13*a* is a sectional view as seen from line 13*a*—13*a* of Fig. 13, and at approximately one-and-a-half times the scale of Fig. 13.

Referring now to Fig. 1, numeral 20 indicates a riveting machine of generally standard style well known to the art, and having C type jaws, an upper jaw 21, and lower jaw 22, the upper jaw 21 having mounted thereon a cylinder 23, in which is reciprocably maintained a piston 24, to which is affixed at the lower side a plunger 26. At the top end of cylinder 23 is a hose 27, which admits pressure fluid, such as oil or air, to the upper end of the cylinder to drive the piston 24 downwardly for the riveting operation, while at the lower end of the cylinder is a hose 28, which admits pressure fluid to the lower end of the cylinder to raise the piston after completion of the riveting operation. The alternate conduction of pressure fluid through hoses 27, 28 is achieved by means of a common type of auxiliary pressure unit, not shown.

A rivet guide and pressure pad assembly 29, illustrative of an embodiment of the invention, is shown attached to the lower jaw 22 of the riveting machine. As more clearly seen in Figs. 2 and 3, the assembly 29 comprises a pressure pad element 31, and a rivet guide element 32, which is secured to the top of the pressure pad, such as by means of two screws 33. The pressure pad has a pair of ears 34 at one end, which are arranged to saddle the lower jaw 22, and are pinned thereto by means, such as screws 36, to pivotally affix the pressure pad to the jaw, so that the assembly 29 has a rocking motion in a vertical plane. A spring 37 is seated at one end in the lower jaw 22, the other end being in abutment with the underside of the pressure pad 31, said spring being under compression to urge the assembly 29 toward uppermost position, as shown. A set screw 38 is arranged near the end of the pressure pad 31 and is extendable from the underside thereof to engage the surface of lower jaw 22 to regulate the extent of the uppermost position of the assembly.

A rivet dolly 39 is removably seated in the lower jaw 22, the top end of the dolly being shaped to conform to the type of rivet head it is desired to form. The dolly 39 is of course in axial alignment with the piston plunger 26.

As best seen in Figs. 7 to 9, the pressure pad 31 has a slot 41 at the free end to allow for clearance with the body of the dolly 39, while on each side of the slot is a raised portion, or boss 42, the top of which supports the free end of the rivet guide 32. The slot 41 has a chamfer 43 to assure full clearance with the body of the dolly 39, for the style indicated. Ears 34 may be integral with

the pressure pad **31**, or be separately formed and welded thereto, as shown.

The rivet guide element **32** is fashioned from a flat piece of metal, a free end portion **44** being stepped upwardly so that when assembled to the pressure pad **31**, the bottom of end portion **44** will engage the top surface of the bosses **42**, and be supported thereby. An elongated hole **46**, formed in the rivet guide **32**, removes a major portion of the body of the rivet guide, while a slot **47**, splits the end portion **44**. By means of such construction, the halved portions or nibs **45** of the end portion **44**, can be forced apart, and will resume original position when released, due to the resiliency of the metal from which the rivet guide is formed. In the end portion **44**, is formed a V-shaped slot **48**, at the vertex of which is formed a hole **49**, part of the circumference of said hole being eliminated by the slot **48**. At the underside of the nibs **45**, and surrounding hole **49**, is formed a counterbore **51**, the purpose for which will be better understood hereinafter. The diameter of hole **49** is slightly larger than the shank of the rivet to be headed, the center of hole **49** being in alignment with the center of the dolly **39**, when the assembly **29**, is mounted in working position on the lower jaw **22**.

Considering now the operation of the invention for riveting operations, rivets **25** (only one shown) are first placed in preformed holes in work sheets **30**, so that the unheaded shanks extend beneath. While the drawings show a plurality of work sheets, the two upper sheets thereof being of greater thickness than the bottom sheet, and a flat head rivet **25** having two shank diameters, it is to be understood that the sheets need not be of such number, nor of different thickness, nor need the rivets be of such style, or of varying diameter, since the invention will work equally well with any number of sheets, and any type of rivet, so long as the extended rivet shank can be properly engaged by the rivet guide nibs **45**.

The operator now moves the work sheets **30**, with extended rivet **25**, in the direction of the assembly **29**, until the shank of the rivet engages a portion of slot **48**, of the rivet guide **32**. Further movement of the sheets toward the assembly results in the rivet shank being finally positioned within the hole **49**; it is to be noted that the rivet shank will slightly spread the nibs **45**, in the process of entering the hole **49**, so that a snap action is effected whereby the rivet shank is locked in proper position. The rivet being now automatically in correct alignment with the dolly **39**, the rivet heading operation can begin.

Referring now to Figs. 10 to 13*a*, the first of said figures illustrates the condition immediately preceding the beginning of the heading operation. The piston plunger **26** has engaged the top of the rivet and motion downwardly, i. e., toward the dolly **39**, is about to begin. Fig. 10*a* shows, in enlarged manner, the relative position, and condition of the rivet **25** at said stage of the operation.

In Figs. 11 and 11*a*, the rivet **25** has engaged the dolly **39**, and heading of the rivet has begun. Note that the pressure of the plunger **26** has forced the stacked sheets, rivet, and the assembly **29**, downwardly with the result that the spring **37**, acting through the pressure pad **31**, and rivet guide portion **44**, has caused the work sheets **30** to be firmly pressed together. Further notice may be had that the nibs **45** have been forced apart slightly, due to the fact that the shank diameter of the rivet has been increased as a result of the pressure reaction by the dolly **39**.

In Figs. 12 and 12*a*, the heading of the rivet has further progressed so that a portion of the rivet head being formed has already engaged the underside of the bottom work sheet, in the area adjacent the rivet hole. The pressure of the spring **37** is still pressing the work sheets firmly together, while the nibs **45**, have been forced further apart. The spreading of nibs **45** expands the counterbore **51** to a size which permits the upper end of the dolly **39** to enter within the counterbore.

In Figs. 13 and 13*a* the rivet head has been fully formed, and the piston plunger **26** is shown moving away from contact with the top end of the set rivet. The work sheets have been moved upward to initial position, due to action of the spring **37**, while the nibs **45** have been fully expanded, and are in engagement with the sides of the newly formed rivet head. It will be seen that the counterbore **51**, formed about the hole **49** in the guide portion **44**, allows the metal sheets to be moved closer to the dolly **39**, so that a rivet head of shorter height but greater area may be formed.

The operator now pulls the riveted sheets away from the assembly **29**, and as soon as the nibs **45** release the rivet head they snap back into initial position. The operator can now repeat the riveting operations on the next rivet in substantially the same fashion.

The axial pressure exerted on the rivet by the hydraulic piston **24** will vary according to the size of rivet, material of the rivet, type of head to be formed, hardness of the rivet, and whether it is to be squeezed hot or cold. This pressure is immaterial insofar as this invention is concerned except that it must be sufficient to form a given head on a given rivet, and at the same time spread the rivet guide **32** with the radial pressure resulting from the forming of the head of the rivet.

It will be appreciated that the spring **37** is designed for satisfactory operation within a given range, hence, when thin sheets are to be riveted, the proper spring size will depend upon the condition of the sheets, i. e., flatness, irregularities, etc. The rivet guide nibs **45**, do not exert enough pressure upon the rivet shank to have any effect on the final head shape; the desired form of rivet head is immaterial since the invention is equally effective when forming heads of the flush type, or countersunk type. The dimensions of the pressure pad and rivet guide depend upon the rivet size, type of head to be formed, space requirements, etc. Such design factors are those which can be established by persons skilled in the art, having once been given the general idea of the features and possibilities of the subject invention. Furthermore, while the invention has been shown and described for operations on rivets arranged with the heads on top and with the unheaded shanks extending from the underside of the work sheets, it is conceivable that the invention could be easily adapted for use on rivets whose shanks extend upward from the top side of the work sheets, if such an arrangement would be found desirable.

While an embodiment of the invention has been shown as applied to a stationary type of riveting machine, it will be recognized that the application is not limited thereto, it being possible to utilize the invention on machines of the portable type, and further, that certain re-arranging, alteration, and redesigning may be effected without departing from the spirit of the invention as set forth in the appended claims.

If desired, either the rivet guide **32** or the pressure pad **31** could be used separately to serve its particular purpose or they can be used in cooperation with each other as shown.

What is claimed is:

1. In a riveting machine, an assembly for attachment to a lower jaw of the machine comprising in combination, a rivet guide element having a rivet guiding and holding means for locating a rivet in proper position for the heading thereof, a pressure pad element pivotally affixed at one end to said lower jaw and affixedly supporting said rivet guide element, and a compression means acting on the pressure pad element to urge the assembly away from the lower jaw of the machine, wherein the guiding and holding means of the rivet guide element includes a pair of nibs resiliently arranged for movement in a horizontal plane, and having a rivet maintaining portion including a rivet guiding slot.

2. In a riveting machine, an assembly according to claim 1, wherein the nibs are integral with the body of the rivet guide element, and wherein the rivet maintaining portion includes an area of reduced cross-section, while the rivet guiding slot is V-shaped, the apex thereof being in the rivet maintaining portion.

3. In a riveting machine, an assembly according to claim 2, wherein the rivet maintaining portion of the rivet guide element is arranged to provide a hole having a diameter the center of which coincides with the center of a rivet heading dolly positioned in the lower jaw of the riveting machine.

4. In a riveting machine, an assembly according to claim 3, wherein the nibs are adapted to be forced apart as a result of the rivet head being formed, and which are adapted to assume initial position when the formed rivet head is withdrawn therefrom.

5. In a riveting machine, an assembly according to claim 4, wherein the nibs are in a raised horizontal plane relative the horizontal plane of the major portion of the rivet guide element, and wherein the under surface of each nib is in engagement with bosses formed on the top of the pressure pad element.

6. In a riveting tool for use in operations in which the unheaded rivet shanks project from the underside of the work piece, including a yoke member, a rivet dolly disposed in a lower arm of the yoke, and a piston plunger disposed in the upper arm of the yoke in axial alignment with the dolly; a rivet guide and pressure pad unit comprising: an elongated rivet guide element having at its forward end a pair of fingers resiliently spreadable in a horizontal plane so as to guide the shank of a rivet through a V notch defined between the ends of the fingers to a hole at the vertex of the notch, the hole being of a diameter slightly greater than that of the shank permitting the fingers to resiliently clamp about the latter after the shank has been received in the hole; a pressure pad in underlying supporting contact with the guide element, having at one end a bifurcation beneath the hole and V notch of the guide element and closely receiving therein an upper portion of the dolly; the opposite ends of the guide element and pressure pad being fastened together and pivotally supported by a common pivot pin as a unit to the lower arm; spring means urging the forward end of the unit in an upward direction about the shank of a rivet received in the hole of the guide element; and adjustable means in the rear of the unit engageable with the lower arm of the yoke to limit the extent of the said upward movement of the unit.

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