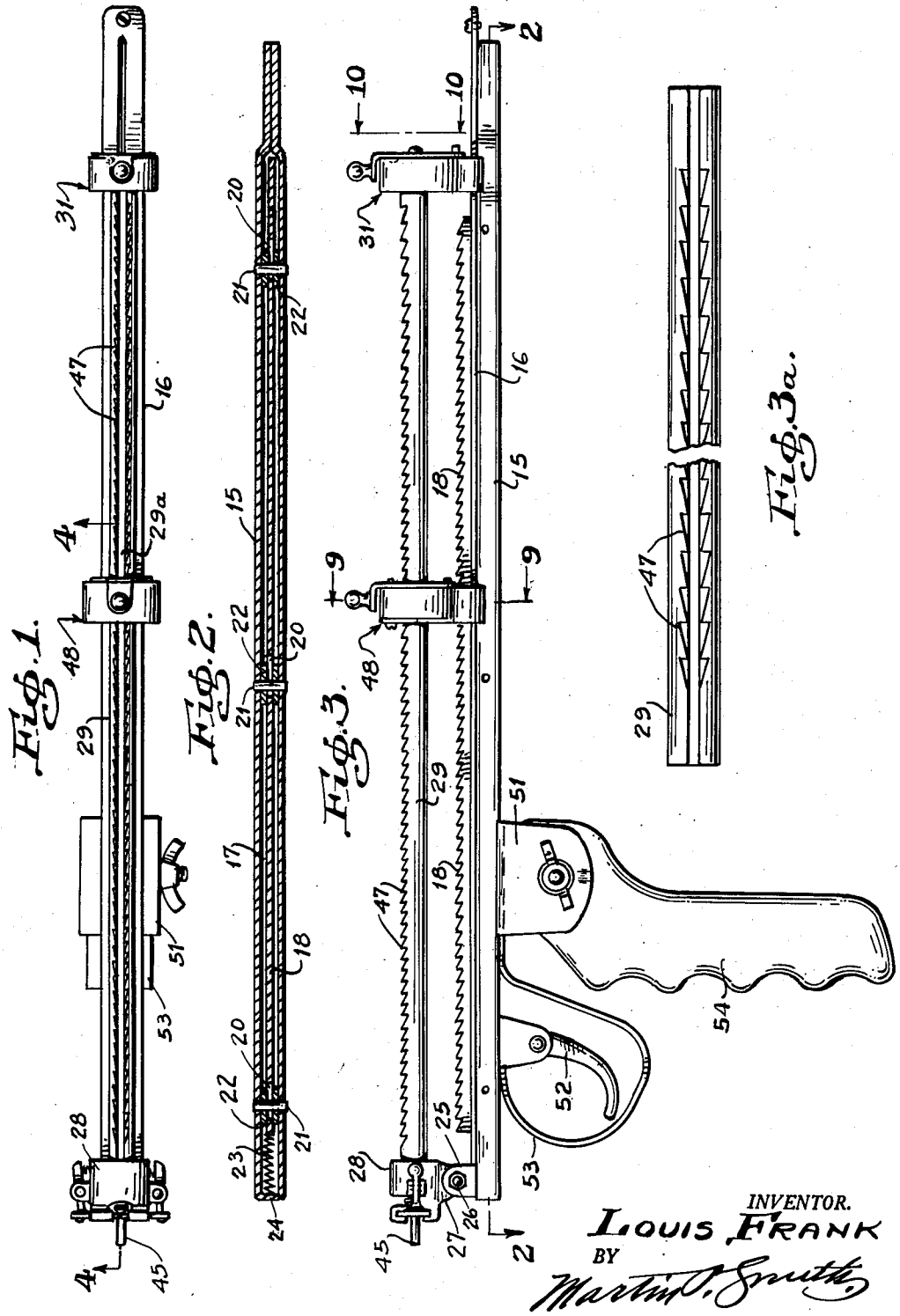
Nov. 4, 1952 L. FRANK 2,616,313

RIVET FEEDING TOOL

Filed May 7, 1949 2 SHEETS—SHEET 1



Nov. 4, 1952 L. FRANK 2,616,313

RIVET FEEDING TOOL

Filed May 7, 1949 2 SHEETS—SHEET 2

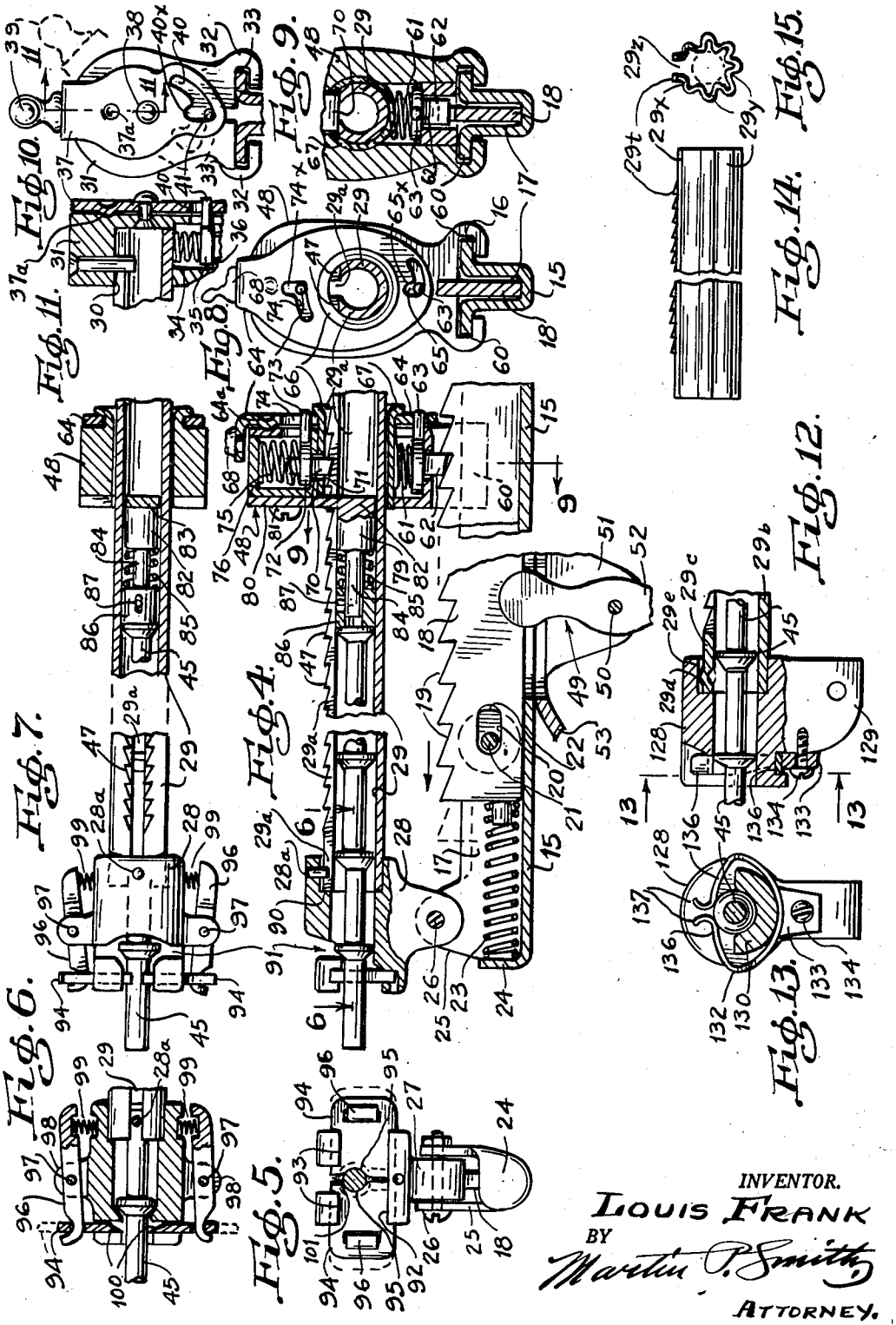


Fig. 10.
Fig. 11.
Fig. 9.
Fig. 8.
Fig. 15.
Fig. 14.
Fig. 7.
Fig. 4.
Fig. 12.
Fig. 6.
Fig. 5.
Fig. 13.

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Patented Nov. 4, 1952 2,616,313

UNITED STATES PATENT OFFICE

2,616,313

RIVET FEEDING TOOL

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Application May 7, 1949, Serial No. 91,930

1 Claim. (Cl. 78—46)

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This invention relates to a manually operable rivet feeding tool. More specifically, the invention pertains to an improvement upon the rivet feeding tool described and claimed in my copending application filed January 15, 1949, Serial Number 71,097, now Patent No. 2,571,436, granted October 16, 1951, on a tool of this class, said application disclosing, for each tool, a plurality of tubular rivet containing magazines, each magazine of the set being separately mountable upon and detachable from the tool and provided with its own rivet feeding plunger.

An important object of the present invention is to provide a rivet feeding tool which, though also equipped with a set of rivet containing magazines, is furnished with a single rivet feeding plunger, said plunger being carried by a mounting means upon which each of the tubular rivet containers is detachably mountable for use, until the tool has fed to the work the rivets which it contains.

Accordingly, it is an object of the present invention to provide a more simple rivet feeding means wherein the feeding of the rivets to the work is performed by means containing a fewer number of parts than has hitherto been deemed necessary for the required purpose.

Another and more specific object is to provide for the tool, as a new article of manufacture, a tubular rivet dispensing magazine into which the rivets may be loaded in a more simple manner.

A further object of my invention is, to generally improve upon and simplify the construction and functions of the existing forms of rivet setting tools of the type and character to which my invention relates.

Other objects, advantages and features of my invention will hereinafter appear.

Referring to the accompanying drawings, which illustrate the preferred embodiments of my invention,

Fig. 1 is a top plan view of the assembled device,

Fig. 2 is a longitudinal section thereof taken on line 2—2 of Fig. 3,

Fig. 3a is a plan view of one of the tubular rivet magazines, separately shown,

Fig. 3 is a side elevation of the assembled device,

Fig. 4 is a longitudinal section on the plane indicated by line 4—4 of Fig. 1, the scale being enlarged and parts being broken away to contract the view,

Fig. 5 is an elevation looking at the left end of the device as shown in Fig. 4,

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Fig. 6 is a fragmental section on line 6—6 of Fig. 4,

Fig. 7 is a view partly in plan and partly in horizontal mid-section, of the parts shown in the upper half of Fig. 4,

Fig. 8 is a view looking at the right hand end of Fig. 4.

Fig. 9 is a fragmental section on line 9—9 of Figs. 3 and 4.

Fig. 10 is an end elevation of the structure shown in Fig. 3, looking from line 10—10 on the latter view, the lower part of the structure being broken away to contract the view,

Fig. 11 is a fragmental section on line 11—11 of Fig. 10.

Fig. 12 is a view, partly in side elevation and partly in vertical mid-section, of a modification,

Fig. 13 is a section on the line 13—13 of Fig. 12.

Fig. 14 is a plan view of a modification of the tubular rivet magazine,

Fig. 15 is an end elevation of the tube shown in Fig. 14.

Referring in detail to the drawings, in common with my aforesaid copending application, the present application discloses, though with alterations, a manually supportable tool comprising an elongated base bar 15, consisting of a strip of form retaining sheet material bent along its midwidth into a narrow U-shape as viewed in cross section, both side portions of said strip being right-angularly out-bent to form flanges 16 along the open side of the U. Within the space 17 between said side portions 16 is mounted a reciprocatory rack bar 18 carrying a row of upstanding ratchet teeth 19 spaced somewhat above said flanges 17.

Said rack bar 18 has but a short reciprocatory movement the length of which is limited by longitudinally slotting the bar 18 at a plurality of points as indicated at 20 in Figs. 1 and 4 and providing rivets or pins 21 which bridge the space between the aforesaid side portions 16 of the U-shaped bar 15, said rivets passing loosely through the slots 20. Each of said rivets is surrounded at each side of said reciprocatory bar with a washer 22, the space between each pair of these washers affording a close but free working fit for said bar. A coiled compression spring 23, abutting against a closure 24 at the front end of said base bar, plays a part in the reciprocation of said rack bar.

From the front end portion of the base bar 15 upstands a pair of spaced apart lugs 25 carrying a pivot pin 26 to which is pivoted the radial ear 27 of a short sleeve 28. Said sleeve is dimen-

sioned to have removably fitted into it the delivery end portion of the tubular rivet carrier or rivet magazine 29 shown, there desirably being a considerable number of these tubular members supplied and all filled with rivets preparatory for use as said members are singly mounted upon the tool. The typical mounted rivet magazine 29 shown extends substantially the entire length of the tool, and is held against rotary displacement by a pin 28a which is carried by said sleeve 28, said pin entering a slot 29a in the tubular member 29.

The rear end portion of said tubular member 29 normally extends loosely into a circular recess or hole 30 provided for it in an upstanding keeper member 31, the lower end of which is provided at each side with a foot 32, each of these feet having an internal, horizontal groove 33 which is slidable along the rail forming flange 16 at its side of the tool.

In order to releasably latch the keeper member 31 in the position shown in Figs. 1 and 3, the lower part of said member is provided with a vertical bore wherein is slidably mounted a spring pressed locking bolt 35, the lower end of which normally interlocks with a hole or locking recess 36 formed in the underlying part of the base bar 15, the sides of said bar being pressed in at this point so as to obliterate the groove or space 17 between them. In order to manually release said bolt from said locking recess, a rockable plate 37 is pivotally fastened at 38 to the back side of the keeper member 31, said plate carrying an operating knob 39 at its upper end and having a cam slot 40 through which projects a pin 41.

Describing further the means for manually advancing the rivets 45 contained within the aforesaid tube 29 toward the delivery end of the latter, said tube is continuously slotted its entire length by means of the aforesaid slot 29a which opens out through the upper side of said tube, a series of ratchet teeth 47 being formed along each side of said slot, said teeth pointing toward the front end of the tool.

A rivet feeding carriage 48, mounted upon the base bar 15 is advanced therealong in a step-by-step fashion by means of the aforesaid reciprocatory rack bar 18. Said rack, in turn, is repeatedly shifted forwardly against the opposition of the aforesaid spring 23 by means of a trigger operated member 49 rockably mounted upon a pivot 50 carried between the two sides of a bifurcated bracket 51 which projects downwardly from the front end portion of the base bar 15. Said member 49 carries a trigger 52 protected by a guard 53 carried by the base bar 15. Mounted on the underside of the base bar 15 rearwardly of the trigger guard 40 is an adjustable pistol grip handle 54 which is grasped by the operator's hand.

It has been stated that the rivet feeding carriage 48 is advanced in a step-by-step fashion by the reciprocatory rack bar 18. Said carriage, like the keeper member 31, has foot portions 60 internally grooved to travel along the track afforded by the flanges 16 of the base bar 15. This carriage is of a hollow character and has in its lower end portion a chamber which contains a compression spiral spring 61 that presses downwardly against a pawl 62 arranged to be repeatedly acted upon by the teeth 19 of the rack bar 18. Said pawl carries an arm 63 operable by a rockable cam plate 64, said arm 63 projecting through a cam slot 65 in said cam plate, the latter being operable to withdraw said pawl 62 from the rack bar to allow the carriage 48 to be slid toward the rear end of the tool. Said cam plate 64 is shown rockably supported on the projecting end portion of a sleeve 66 which passes through the carriage 48 and provides a broad, smooth bearing surface between said carriage and aforesaid tube 29. A keeper flange 67 is carried by the projecting end of said sleeve to hold the cam plate 64 in place. A knob 68 on the upper end of said cam plate facilitates its manual operation.

In order to prevent a backstepping of the carriage 48 along the tube 29 when the spring pressed rack 19 shifts rearwardly at each reciprocation, the carriage 48 is provided with an upper spring pressed pawl 70 which cooperates with the aforesaid ratchet teeth 47 of the tubular member 29. This pawl comprises a pin having a lower end portion which projects downwardly through a bore 71 into contact with the ratchet teeth 47, said pin being carried by a collar 72 that grips its midlength portion. Said collar, in turn, carries a radial arm 73 which projects out from the hollow member 48, its projecting portion passing through a cam slot 74 in the upper part of the aforesaid cam plate 64. A compression spring 75 surrounds the upper end portion of the pawl pin 70, said spring operating between the aforesaid collar 72 and a cover plate 76 fitted in a friction tight manner into the upper end of the hollow carriage 48.

Describing additional details regarding the cam plates 37 and 64, their cam slots 46, 65 and 74 are respectively shown having extensions 40x, 65x and 74x to allow the pawl pins or arms which pass through the cam slots to move sufficiently to permit the pawls to glide over the ratchet teeth with which they cooperate. The cam plate 37 is yieldingly held in one of its adjusted positions by a recess and dimple arrangement indicated at 37a, and the cam plate 64 is shown provided with a like means 64a yielding to hold it in adjusted position.

An important feature of the present invention resides in the provision of a single rivet feeding or rivet advancing member 79 which is shown supported from the carriage 48 by means of a semi-circular mounting plate 80 attached by screws 81 to the carriage 48. The inner post of said member 79 is integral with and projects right angularly out from a downwardly directed flattened head 82, slidable within the tube 29, said head being connected with the upper part of said plate 80 by means of a neck 83 narrow enough to travel along the already mentioned slot 29a. This rivet advancing member is shown comprising a pin having a diametrically reduced outer part 84 that produces an annular shoulder against which abuts one end of a spring 85, the opposite end of said spring engaging a short rivet driving sleeve 86 that is slidably carried by said part 84, said sleeve being prevented from detachment by a groove and pin connection 87.

One of the improvements provided by the present invention relates to the rivet delivery means located at the front end of the tool. It has already been mentioned that a sleeve 28 is swingably attached to the front end portion of the base bar 15, said sleeve removably receiving the front end of whatever rivet containing tube 29 is mounted upon the tool. Said sleeve is shown having its internal diameter reduced throughout its front end portion, thus providing an annular shoulder 90 against which abuts the front end of the inserted tube 29, the smaller internal di-

ameter of the sleeve being the same as the internal diameter of the inserted tube **29** to form a smooth surface over which the advancing rivets slide.

Adjacent to its front, rivet delivery end, the sleeve **28** has extending downwardly into it a transverse, semi-circular slot **91**, through the space under which the shanks of the successively delivered rivets are projected, and beyond said slot said sleeve carries an upwardly directed lower lip **92** and a pair of downwardly directed upper lips **93**, these three lips cooperating to form a transverse guideway for a pair of twin cooperating rivet holding slides **94** between which the shank of each partly extruded rivet is held pending its complete delivery, said slides preventing premature delivery of the rivets. Each of said slides has an arcuate notch **95** in its inner end, the notched parts of said slides cooperating to engage the shanks of the rivets as shown in Fig. 5, temporarily to support each rivet shank ejected into the space between said slides.

Each of said twin slides **94** is apertured near its outer end to receive loosely one end of a lever **96** the midlength portion of which has extending through it a pivot pin **97** bridging the space between a pair of lugs **98**, these pairs of lugs projecting laterally from opposite sides of the member **28**, as well shown in Figs. 6 and 7. Compression springs **99**, held in place by suitable recesses, underlie the rear ends of said levers and tend to swing them to a position wherein they hold the slides **94** so close to each other that there is not quite space enough between the notches **95** of said slides to accommodate the shank of an extruded rivet. However, the notched parts of the three slides are internally beveled as indicated at **100**, and as each rivet is forced out of a tube **29**, the forward end of its shank encounters the bevelled portions of the slides **94** and retracts said slides sufficiently to pass between them, till the rivet reaches the position shown in Figs. 4 and 5. When in this position, the head of the rivet is opposite to the aforesaid notch **91** in the upper side of the member **28** so that, so far as the head of the rivet is concerned, there is no obstruction to the downward movement of the tool in relation to the rivet; and so far as the rivet shank is concerned, it also will not prevent a downward relative movement of the tool, because the rivet can (when the outer part of its shank is in a rivet hole in the work) be forced out through the isthmus **101** between the yielding slides **94** above their notches **95** and thence through the space between the upper lips **93**.

In Figs. 12 and 13 is shown a modification of the means stationed at the rivet delivery end of the tool to control the handling of the fed rivets as the tool is detached from them. In this modification, a sleeve **128** is substituted for the aforesaid sleeve **28**, and is provided with a downwardly directed ear **129** whereby it is pivoted to a bifurcated front end portion of the tool in the same manner as the aforesaid sleeve **28**. Said sleeve **128**, however, is not provided with spring pressed rivet holding jaws, but instead has the upper part of its front end portion semi-circularly cut away leaving a semi-circular rivet rest portion **130** which is loosely embraced by a flattened spring wire **132** carried by a clip **133** attached by a screw **134** to the front side of the ear **129**. Said spring wire has a pair of cooperating upwardly directed arms **136** with adjacent reversely curved end portions **137** which spring apart as the shanks of the delivered rivets are forced between them. A slightly modified tubular rivet magazine **29***b* is shown in Fig. 12, said magazine having an unslotted adjacent end portion **29***c* which carries outpressed rise **29***d* positioned to cooperate with a slot **29***e*, thus yieldingly holding the tube in the true rotational position preparatory to placing the opposite end portion in place by means of the carriage **31**.

Said carriage **31**, already mentioned as a keeper member for the tubular rivet magazine, may be shifted so far to the rear as to leave space for the second carriage **48** also to be shifted rearward sufficiently to clear the rear end of a mounted tube **29** or **29***b* preparatory to removing the tube when the rivets have all been delivered therefrom.

When a new rivet containing tube is mounted upon the tool, it is necessary that, after the front end of the tube has been put into place in the way already described, the long slot **29***a* be maintained precisely at the top side of the tube so that, when the rivet advancing member **79** of the carriage **48** (see Fig. 4) is alined with the lumen of the tube at the rear end thereof, the neck **83** of the rivet advancing member **79** will aline with said slot **29***a* to be projected into said slot to travel therealong during the rivet feeding operation. This rotational position of the tube **29** is obtained by the use of the pin **28***a* carried by the swingable sleeve **28**; or, in the case of the modified tube **29***b*, by the nodule or swell **29***d* on the latter tube which swell is slidable into the aforesaid short internal slot **29***e* of the sleeve **28**.

What has just been said will aid in understanding how a rivet-filled tube **29** will be mounted upon the tool. However, it is to be noted that, preparatory to mounting said tube, the carriages **31** and **48** will both be shifted sufficiently near to the read end of the base bar **15** to allow the operator, after inserting the front end of the tube into the sleeve **28** to swing the rear end of said tube down into alinement with the carriage **48**, and thereupon to move this carriage forwardly along the tube until the rivet driver **79** carried thereby encounters the rearmost of the rivets in the end-to-end row of rivets contained in the tube, the operation of mounting the tube being completed by advancing the carriage or keeper member **31** until its spring pressed latching bolt or dog **35** enters the locking recess **36** in the base bar **15***x*. Then the tool is ready for use, the operator, while grasping the handle **54**, using the trigger **52** repeatedly to shift the rack **19** forwardly against the opposition of its spring **23**. Through the cooperation of the teeth of said rack with the pawl **62** of the carriage **48** each aforesaid forward shifting of the rack will advance the row of rivets **45** (with their shanks directed forwardly), toward the delivery end of the tool. The front end of the shank of each foremost rivet will thus be caused forcibly to engage the bevels **100** of the yielding mounted slides **94**, forcing said slides apart till the rivet reaches the partly extruded positions shown in Fig. 6, when it is ready to be inserted into the bore provided for it in the work, thereupon to be disconnected with the tool when the operator forcibly shifts the front end of the latter downwardly, the yieldingly mounted slides **94** separating sufficiently to allow the shank of the delivered rivet to escape through the isthmus **101** between them.

The operation of the cam plate **64** and dog

70 of the carriage 48 is similar to that of the corresponding parts of the carriage 31, therefore, as an aid to fully understanding both, it need only be pointed out that when said cam plate 64 is in its normal position shown in Fig. 8, the arm 63 of its pawl 62 is free to reciprocate vertically in the cam slot extension 65x allowing said pawl to glide forwardly over the teeth of the rack 19 each time the spring 23 (see Fig. 4), returns the trigger operated rack 19 to normal position. Also, when said cam plate 64 is in this position, the arm 73 of its upper pawl 70 is free to reciprocate vertically in the cam slot extension 74x so that said pawl can glide over the upper double row of rack teeth 47 as the carriage 48 advances along the tube 29. It will now be obvious that when the cam plate 64 is rocked in a clockwise direction from the position thereof shown in Fig. 8, its pawls 62 and 70 will be shifted to inoperative positions making it possible to disengage the carriage 48 from the tube 29.

In Figs. 14 and 15 is shown a further modification of the rivet delivery tube, designated 29x in these views. This modified tube is provided to afford a tube with a smaller internal diameter to handle rivets of a smaller diameter in the same tool as that used for rivets of a relatively large diameter; but in doing this, it is necessary in each case to maintain the same external diameter of tube so that it will properly fit into the mounting means therefor. The tube shown in Figs. 14 and 15 could be made with a relatively thick wall, but it is preferred to corrugate it as indicated at 29y so as to economize material. Like the first described tube, it has an end-to-end slot, in this instance designated 29z, and a row of ratchet teeth 29t along each side of said slot.

Thus, it will be seen that I have provided a manually operable rivet feeding tool that is simple in structure, inexpensive of manufacture and very effective in performing the functions for which it is intended.

Minor changes in the size, form and construction of the various parts of my improved rivet setting tool may be made and substituted for those herein shown and described without departing from the spirit of my invention, the scope of which is set forth in the appended claim.

I claim:

In a device of the kind described, the combination with a base bar including a guide means which extends longitudinally thereof, an elongated rivet magazine, means to support said magazine by said base bar in a parallel upwardly spaced relation to said guide means, said magazine being furnished with an elongated rivet passage to contain a row of end-to-end rivets, a carriage mounted upon said guide means to travel therealong, a rivet advancing plunger supported by said carriage and positionable to engage the rearmost of a row of rivets in said passage to advance said row of rivets toward a point of delivery from said passage, manually operable spring held means mounted upon said base bar and operably connected with said carriage to advance the latter in a step-by-step fashion repeatedly, to deliver, to a piece of work, the foremost rivet of a row of rivets contained in the aforesaid passage, the aforesaid rivet magazine being detachable from said base bar when emptied of rivets, in order to be replaced by another like filled rivet containing magazine of a rivet discharge member mounted on a horizontal axis to the top of the forward end of said base bar, there being a pin and slot connection between the top of said discharge member and said rivet magazine, lips on the forward end of said rivet discharge member to form a transverse guide way, one lip below and two lips above, twin slides arranged for operation in said guide way, the inner ends of which slides are arcuate in form and bevelled to cooperate with the rivets in the rivet magazine, levers pivoted on the sides of the discharge member and engaging said slides and springs between the rear ends of said levers and said discharge member.

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