

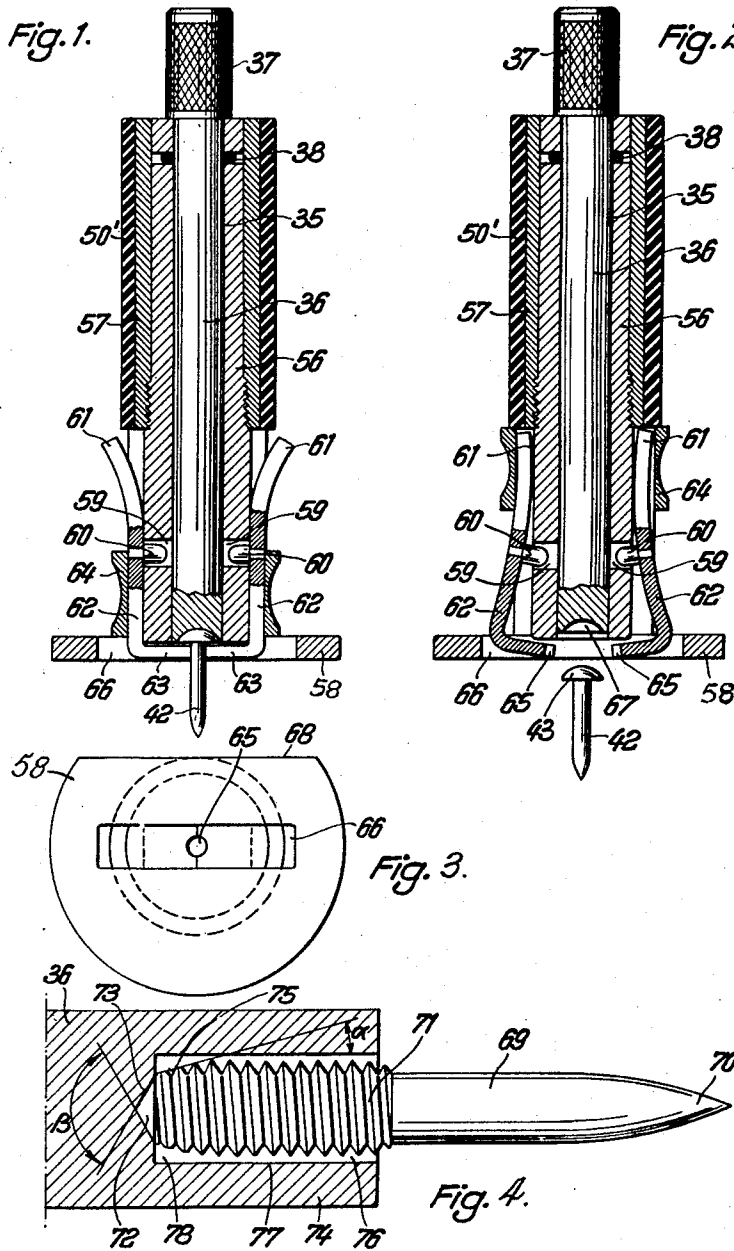
July 28, 1959

M. HILTI
STUD DRIVING DEVICE

2,896,209

Filed April 4, 1957

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

Fig. 5.

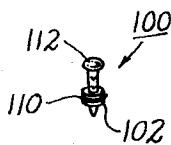
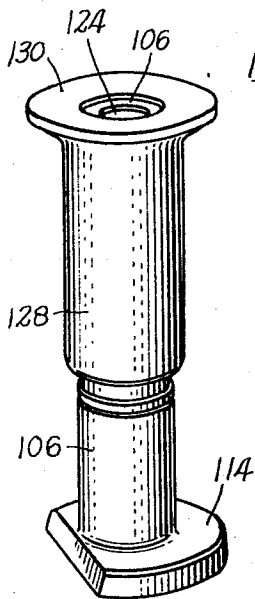
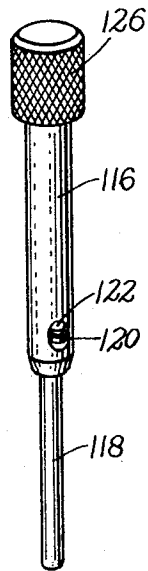


Fig. 6.

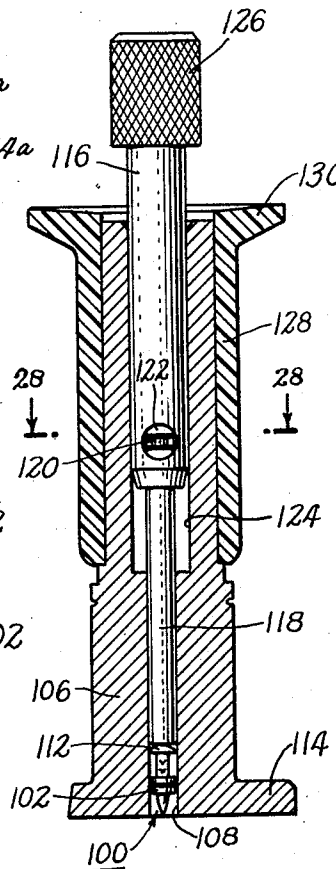


Fig. 9.

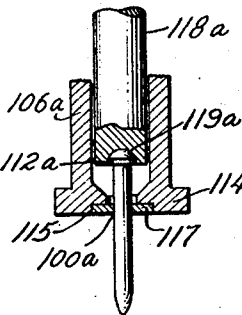


Fig. 8.

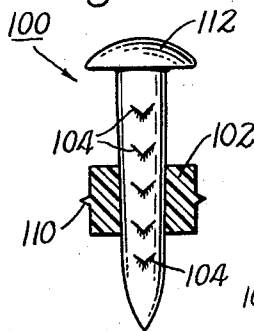
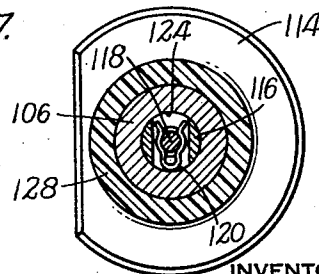


Fig. 7.



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3 Sheets-Sheet 3

Fig. 10.

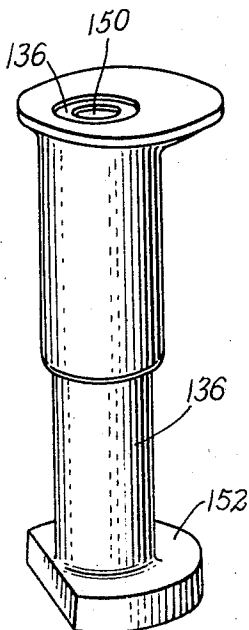
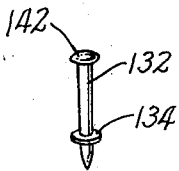
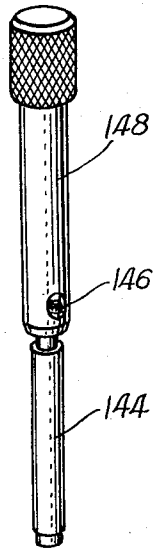


Fig. 11.

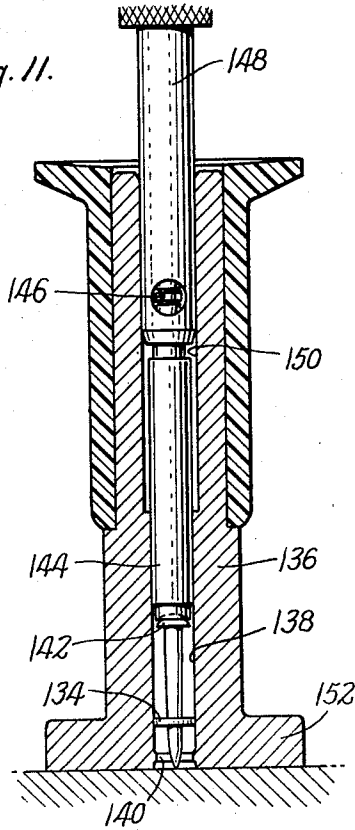
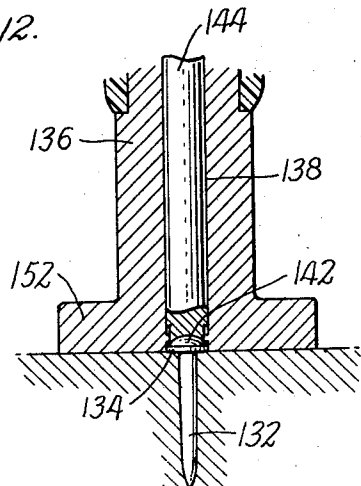


Fig. 12.



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1

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STUD DRIVING DEVICE

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Application April 4, 1957, Serial No. 650,701

Claims priority, application Austria May 8, 1953

15 Claims. (Cl. 1—47)

This invention relates to hand-held apparatus for manually driving anchoring studs into hard materials by hammer blows. This application is a continuation-in-part of my copending application Serial No. 426,197, filed April 28, 1954, now abandoned.

During construction work and the like, it frequently is necessary to attach fasteners such as wall hooks, binding clips, etc. to hard material such as concrete, cement, structural steel, etc. In the past, this has been done by a variety of methods each having a number of important disadvantages including high cost. For example, iron and steel commonly were drilled and threaded to receive a correspondingly threaded fastener. For attachment to ceramic materials, recesses were chiseled out and plugged with relatively soft material suitable for supporting fasteners. Recently it has also become known to drive fasteners directly into the hard material by the force of a gas explosion. All of these measures are complicated and require special auxiliary devices which are not always available. Further, the explosive-type driving tools require very precise safety provisions which render their use impracticable in many cases, and add to their expense.

It has long been thought impossible to drive stud fasteners into a hard receiving material directly by a mechanical blow. This view was partly based on the idea that the breaking strength of the materials normally used for such fasteners, considered in terms of the length of the fastener between its sharp tip and the impact point of the hammer used for driving, is less than the stresses which occur upon delivery of the required blow.

The present invention stems from the conception that the compression strength of the materials normally used in the manufacture of such studs is great enough to permit the studs to be driven into hard receiving materials by the mechanical force supplied by a hammer. However, it has been found that the apparatus used for driving the stud must be arranged in such a manner that several important functions are performed simultaneously. Certain stud-driving devices proposed heretofore have included constructional arrangements for performing some of these functions individually, or partly combined, but it has not been appreciated that the full combination provides surprisingly superior results in achieving the object of this invention.

Driving tools known heretofore have been arranged to guide the direction of force of the hammer blows from the arc corresponding to the hand movement into a straight line approximately coinciding with the axis of the fastener, as by means of a ram inserted as an intermediate driving member. However, appropriate attention has not been paid to the fact that other conditions must simultaneously be fulfilled especially because of the low breaking strength of the usual fasteners. According to this invention, the driving device is arranged in such a manner that the fasteners will not buckle so that their compression strength can be fully utilized.

2

In a preferred embodiment of the invention to be described hereinbelow in more detail, there is provided a driving tool comprising a tubular member adapted to be gripped in the hand, and within which is guided a ram actuated along a straight line by mechanical blows, e.g. from a hammer. This driving tool includes a base flange arranged to rest against the material into which the fastener is to be driven, and which prevents the tool from tilting. To assure exact axial alignment of the fastener in the direction of penetration, the driving tool includes two guide elements between which the fastener extends during the driving operation, and which are as remote as possible from each other at the beginning of the driving operation. The struck end of the fastener is guided by surface contact engagement with centering surfaces in the drive tool.

The cooperation of these features assures that force transmitted through the ram to the fastener is in a direction which is very accurately coaxial with the longitudinal axis of the fastener, thereby avoiding force components deviating from this axial direction. Consequently, buckling or bending of the shaft of the fastener during the driving operation does not occur even when great resistance is encountered due to the hardness of the material into which the fastener is to be driven.

Other objects, aspects and advantages of the present invention will be in part pointed out in, and in part apparent from, the following description of several embodiments of the invention, considered together with the drawings, in which:

Figure 1 shows, in longitudinal section, a driving tool having a pair of laterally-displaceable guide elements controlled by a slidable ring;

Figure 2 shows the tool of Figure 1 with the guide elements displaced for insertion of the fastener;

Figure 3 is a plan view of the base flange of the tool of Figure 1;

Figure 4 shows a fastener having a threaded head and a conical centering element;

Figure 5 is a separated perspective view of a tool used with a stud carrying a guide washer;

Figure 6 is a vertical section through the assembled tool of Figure 5;

Figure 7 is a detail view of the catch device used to secure a replaceable plunger to the ram driving member;

Figure 8 is an enlarged section showing the stud and washer;

Figure 9 is a detail view, in longitudinal section, of a modified base-flange arrangement;

Figure 10 is a separated perspective view of a modified tool used with a stud carrying a guide washer;

Figure 11 is a vertical section through the assembled tool of Figure 10; and

Figure 12 is a detail section showing the stud and washer after they have been driven into place.

Referring now to Figure 1, the tool shown there includes a tubular ram guide 56 integral with the base flange 58. A handle member 57 is threadably engaged with the ram guide and is covered by a rubber sheath 50' to minimize vibrations transmitted to the hand during a driving operation. The fastener 42 is held in place and guided by a pair of oppositely-positioned rockable arms 62. Each of these arms includes a pivot pin 60 extending inwardly into a corresponding recess 59 formed in the ram guide 56.

The lower inwardly-curved tips 63 of the arms 62 (see also Figure 3) are formed with semi-circular guide surfaces 65 which are adapted to engage the shank of the fastener 42 during a driving operation. Referring now also to Figure 2, the tool is provided with an adjusting ring 64 closely fitted about the rockable arms 62. These arms are formed with outwardly-curved upper portions 61

so that, as the ring is moved upwardly, the arms pivot about the pins 60 and their tips 63 are spread apart to permit the fastener head 43 to be inserted into the curved receptacle 67 in the bottom of the ram 36. After the fastener has thus been positioned, the adjusting ring 64 is moved downwardly (to the position shown in Figure 1) so that the guide surfaces 65 grip the shank of the fastener and hold it in place preparatory to a driving operation. The base flange 58 is formed with a slot 66 which accommodates required motion of the tips 63 of the rockable arms 62. Further, the base flange preferably is flattened as at 68 so that the tool may be used in restricted spaces.

A ram 36 is slidably positioned in the cylindrical bore 35 formed by the ram guide 56 and is lightly held in place by a friction element 38. Figure 1 shows the tool and the fastener 42 at the end of a driving operation; however, it will be apparent that at the start of a driving operation the tip of the fastener 42 normally will be resting on the receiving material (not shown) aligned with the lower surface of the base 58, and that the ram 36 will correspondingly be positioned a short distance up in the ram guide 56 with the fastener head 43 in the recess 67. To drive the fastener, the impact member 37 of the ram is struck as by means of a manually-held hammer, and the force of the blow will drive the fastener into the receiving material.

It has been found especially desirable to provide the bottom face of the ram with a recess having inwardly sloping surfaces snugly engageable with a congruent portion of the rear end of the fastener. Such surfaces are referred to herein as "centering surfaces" in that they tend to automatically align the shaft of the fastener with the axis of the ram during a driving operation, and for example may take the form of a conical recess or a spherical recess as shown in Figures 1 and 2.

This feature is shown in more detail in Figure 4 wherein a fastener 69 having a ballistic tip 70 is positioned in a receiving bore 77 in the striking end 74 of the ram 36. The fastener is provided with a conically-shaped rear portion 72 which fits tightly into a corresponding conical recess 73 at the rear of the bore 77. The included angle "B" between opposite sides of this recess 73 preferably is about 120 degrees.

The threaded head 71 of the fastener 69 is bevelled at 75 at an angle "a" of about 15 degrees. This bevelling is provided so that, if the threaded head is dimensioned such that it fits tightly against the walls of the receiving bore 77 (as with a larger-sized fastener than shown) a space 78 will be provided in which particles of dirt, iron filings, dust residue from machining, etc., may be received and thereby avoid the decentering or binding effect which otherwise would be produced by such particles during a driving operation. The bevelling also prevents the threaded head 71 being jammed in the bore 77 even when the head is slightly upset during the driving operation.

Figures 5 through 7 show a tool arranged to drive a tapered metal stud 100 (see also Figure 8) which carries a moderately resilient plastic guide washer 102 jammed tightly on the stud shank. This shank is formed along its length with raised portions 104 which engage the washer to hold it firmly in position, and which also improve the pull-out strength of the stud after it has been driven into hard material.

The tool includes a tubular ram guide 106 provided at its lower end with a smoothly-cylindrical axial bore 108 adapted to receive and frictionally retain the stud guide washer 102. The diameter of bore 108 is less than the outer diameter of the washer 102, but the difference in these diameters is so small as to permit the stud and washer easily to be inserted manually into the bottom opening of the tool. Frictional engagement between the washer and the ram guide inner surface is amply sufficient to assure that the stud will not fall out

when the tool is in upright position (as shown), and yet permits the washer easily to slide within the bore when a moderate force is applied.

The desired degree of frictional engagement is particularly achieved by forming the washer 102 with a thin flexible contact ring 110 extending around the main body of the washer. This ring may for example be formed during manufacture of the washer, as in a punching or casting operation, simply by arranging the washer forming dies in such a manner that a small ring of plastic "flashing" remains after the operation has been completed. When the stud 100 and washer are manually inserted into the tool, the ring 110 contacts the walls of the bore 108 and, due to the resilience of the washer material, is easily compressed so as to assure proper frictional engagement with the tool.

The head 112 of the stud 100 has effectively the same diameter as bore 108. Thus, the walls of this bore serve as guiding and centering surfaces which, in conjunction with the guiding action provided by the washer 102, operate to maintain the stud axially aligned with the bore during a driving operation. A base flange 114, integral with the ram guide 106, supports the tool perpendicularly with respect to the material into which the stud is to be driven.

Slidably mounted for axial movement in the tool is a ram comprising a driving member 116 and a replaceable plunger 118 which closely fits within and is guided by the bore 108. The upper end of the plunger extends into a recess formed in the driving member and is removably secured thereto by a catch device consisting of a spring 120 (see particularly Figure 7) which is tightly fitted into an annular groove extending around the upper end of the plunger. This spring is inserted into place through an opening 122 communicating with the driving member recess, and engages the opposing side walls of this member so as to secure the plunger in place. With this arrangement, a single driving member can be used with a number of different plungers, thereby reducing the cost of operating the tool.

The driving member 116 is slidably fitted within an upper bore 124 which is axially aligned with the lower bore 108. Secured to the top of member 116 is a knurled head 126 adapted to be struck by a hand-held hammer to drive the stud 100 into hard material. Surrounding the ram guide 106 is a plastic hand-grip 128 the upper end of which is provided with a flange 130 to shield the user's hand from misdirected hammer blows.

Figure 9 shows an arrangement wherein the base flange 114a is integral with the tubular member 106a. Also, the lower surface of the base flange is provided with a shouldered recess 115 in which is disposed an anchor disc 117 which serves as a surface contact guide for the shank of the stud 100a, and also serves to provide a fairly large base for receiving the stud in softer material. The lower face of the ram 118a is provided with a curved recess 119a engageable with the head 112a of the stud, and by means of which this head is exactly centered during a driving operation.

Figures 10 through 12 show another form of tool adapted for use with a stud carrying a guide washer. In this arrangement, the metal stud 132 has a slightly tapered shank onto which is jammed a deformable thin metal guide washer 134. The taper of the shank provides a close frictional fit which assures that the washer is firmly fixed in place.

The tool includes a tubular ram guide 136 formed with a cylindrical bore 138 the diameter of which is dimensioned to provide a close fit with the washer 134. At the lower end of this bore, the ram guide is provided with a circular lip 140 which protrudes a small distance into the interior of the bore. The inner diameter of this lip is slightly smaller than the diameter of the washer, but slightly greater than the diameter of the stud head 142.

5

When the stud 132 is positioned for a driving operation (see Figure 11), its rounded head 142 engages a congruently-shaped mating recess in the end of the ram plunger 144. Thus, the stud is guided at the top by mating centering surfaces, and at the lower end of its shank it is guided by the centering action of the washer 134 which slides within the bore 138. As described above with reference to Figures 5 through 7, the plunger 144 is secured by a catch device 146 to the ram driving member 143 which slides within an upper bore 150 in the ram guide.

This tool is loaded for a driving operation merely by dropping the stud, with washer attached, into the top of the upper bore 150. The stud will fall into the lower bore 138 and come to rest with the washer abutting the lip 140. When the tool is placed in driving position with its base flange 152 flat against the material into which the stud is to be driven, the stud will of course be moved back up into the lower bore until (as shown in Figure 11) the point of the stud is aligned with the lower surface of the base.

While the stud is being driven by hammer blows applied to the ram driving member, the washer 134 will move down with the stud 132 until it engages the lip 140. Subsequently, the stud shank normally will move through the washer, which thus provides continuous guiding action, until the stud head 142 comes into contact with the washer. With further downward motion of the stud, the stud head deforms the washer slightly (as by bowing it into concave shape) so that it slips by the lip 140 and ultimately is seated firmly with the stud against the material to which the stud is fixed (see Figure 12).

I claim:

1. A hand-held stud-fastener driving tool for manually driving fasteners into hard material by a series of blows from a hand-held hammer, comprising, in combination, means including a tubular member, a ram slidable within and guided in a straight line path by said tubular member, said ram having an impact receiving end and a fastener striking end, a base flange attached to the lower end of said tubular member and adapted to rest against the material into which the fastener is to be driven and forming a support for said tubular member to prevent tilting movement thereof, said base flange having an opening therein communicating with a striking end of said ram, said ram being provided with a recess to receive and guide the head end of a fastener extending through said base flange opening, and second guide means located within said base flange opening and arranged to contact and guide the shank of a fastener during a driving operation, said second guide means including at least one arm supported on said tubular member for lateral motion towards and away from the shank of the fastener.

2. A hand-held stud-fastener driving tool for manually driving fasteners into hard material by a series of blows from a hand-held hammer, comprising, in combination, means including a tubular member, a ram slidable within and guided in a straight line by said tubular member, said ram having an impact receiving end and a fastener striking end, a base flange attached to the lower end of said tubular member and adapted to rest against the material into which the fastener is to be driven and forming a support for said tubular member to prevent tilting movement thereof, said base flange having an opening therein communicating with a striking end of said ram, said ram being provided with a recess to receive and guide the head end of a fastener extending through said base flange opening, and second guide means located within said base flange opening and arranged to contact and guide the shank of a fastener during a driving operation, said second guide means including a pair of opposed arms supported on said tubular member for lateral motion towards and away from the shank of the fastener.

3. A hand-held stud-fastener driving tool for manually driving fasteners into hard material by a series of blows

6

from a hand-held hammer, comprising, in combination, means including a tubular member, a ram slidable within and guided in a straight line by said tubular member, said ram having an impact receiving end and a fastener striking end, a base flange attached to the lower end of said tubular member and adapted to rest against the material into which the fastener is to be driven and forming a support for said tubular member to prevent tilting movement thereof, said base flange having an opening therein communicating with a striking end of said ram, said ram being provided with a recess to receive and guide the head end of a fastener extending through said base flange opening, second guide means located within said base flange opening and arranged to contact and guide the shank of a fastener during a driving operation, said second guide means including at least one arm supported on said tubular member for lateral motion towards and away from the shank of the fastener, and manually-operable means for controlling said lateral motion.

4. A hand-held stud-fastener driving tool for manually driving fasteners into hard material by a series of blows from a hand-held hammer, comprising, in combination, means including a tubular member, a ram slidable within and guided in a straight line by said tubular member, said ram having an impact receiving end and a fastener striking end, a base flange attached to the lower end of said tubular member and adapted to rest against the material into which the fastener is to be driven and forming a support for said tubular member to prevent tilting movement thereof, said base flange having an opening therein communicating with a striking end of said ram, said ram being provided with a recess to receive and guide the head end of a fastener extending through said base flange opening, second guide means located within said base flange opening and arranged to contact and guide the shank of a fastener during a driving operation, said second guide means including at least one arm having a portion thereof extending away from said base flange opening and alongside said tubular member, said arm portion being pivotally supported on said tubular member and formed with a slight curve to permit rocking motion thereof about said pivotal support to produce lateral motion of the guiding end of said arm towards and away from the shank of the fastener, and a manually-movable ring encircling said arm portion and said tubular member and arranged when moved longitudinally of said tubular member to engage said curved arm portion whereby said portion may be rocked about its pivot mounting to produce said lateral motion.

5. A hand-held stud-fastener driving tool for manually driving fasteners into hard material by a series of blows from a hand-held hammer, comprising, in combination, means including a tubular member, a ram slidable within and guided in a straight line path by said tubular member, said ram having an impact receiving end and a fastener striking end, a wide base flange attached to and extending outwardly from the lower end of said tubular member and adapted to rest against the material into which the fastener is to be driven to form a stable support base for said tubular member to prevent tilting movement thereof, said base flange having an opening therein communicating with a striking end of said ram, and guide means located within said base flange opening and arranged to contact and guide and shank of a fastener during a driving operation, said guide means including at least one arm supported on said tubular member for lateral motion towards and away from the shank of the fastener.

6. A hand-held tool adapted to drive a fastener of the type including an elongated shank having a pointed tip at one end and a driving head at the other end with said shank carrying a guide washer positioned remotely from said head end prior to the start of a driving operation, said tool comprising, in combination, means including a

tubular member, a ram slidable within and guided in a straight line path by said tubular member, said ram having an impact-receiving end and a fastener striking end, a broad base flange attached to and extending outwardly from the lower end of said tubular member and adapted to rest against the material into which the fastener is to be driven and forming a wide support base for said tubular member to prevent tilting movement thereof, said base flange having an opening therein communicating with the striking end of said ram, and washer-engaging means located at said base flange opening for engaging said guide washer to maintain said washer and the shank of said fastener laterally fixed in position relative to said tubular member during a driving operation.

7. A hand-held tool adapted to drive a fastener of the type including an elongated shank having a pointed tip at one end and a driving head at the other end with said shank carrying a guide washer positioned remote from said head end prior to the start of a driving operation, said tool comprising, in combination, means including a tubular member, a ram slidable within and guided in a straight line by said tubular member, said ram having an impact-receiving end and a fastener striking end, a base flange attached to the lower end of said tubular member and adapted to rest against the material into which the fastener is to be driven and forming a support for said tubular member to prevent tilting movement thereof, said base flange having an opening therein communicating with the striking end of said ram, said base flange further being provided with a recess around said base flange opening to receive and tightly engage said guide washer to maintain said washer and the shank of said fastener laterally fixed in position relative to said tubular member during a driving operation.

8. A hand-held tool adapted to drive a fastener of the type including an elongated shank having a pointed tip at one end and a driving head at the other end with said shank carrying a tightly-fitted guide washer near the tip end thereof, said tool comprising, in combination, means including a tubular member, a ram slidable within and guided in a straight line by said tubular member, said ram having an impact-receiving end and a fastener striking end, a base flange attached to the lower end of said tubular member and adapted to rest against the material into which the fastener is to be driven and forming a support for said tubular member to prevent tilting movement thereof, said base flange having an opening therein communicating with the striking end of said ram, and a lip protruding inwardly from the interior surface of said tubular member near said base flange opening to serve as a stop-element for normally preventing the movement of said washer thereby, the interior surface of said tubular member adjacent said lip serving to engage the peripheral edges of said guide washer to maintain said washer and the shank of said fastener laterally fixed in position relative to said tubular member during a driving operation.

9. A hand-held tool adapted to drive a fastener of the type including an elongated shank having a pointed tip at one end and a driving head at the other end with said shank carrying a readily-deformable guide washer near the tip end thereof prior to the start of a driving operation, said tool comprising, in combination, means including a tubular member, a ram slidable within and guided in a straight line by said tubular member, said ram having an impact-receiving end and a fastener striking end, a base flange attached to the lower end of said tubular member and adapted to rest against the material into which the fastener is to be driven and forming a support for said tubular member to prevent tilting movement thereof, said base flange having an opening therein communicating with the striking end of said ram, and a ring-shaped lip extending inwardly from the interior surface of said tubular member a distance that is small relative to the interior lateral dimension of said member, said lip serving as a stop element for axially positioning the

washer of said fastener above said lip but permitting said washer to pass by said lip when the washer is deformed by being struck by the head of said fastener, the interior surface of said tubular member serving to engage the peripheral edges of said guide washer to maintain said washer and the shank of said fastener laterally fixed in position relative to said tubular member during a driving operation.

10. In a tool of the character described for driving studs into a hard material, said studs being of the type including an elongated shank having a pointed tip at one end and a driving head at the other end with said shank carrying a guide washer positioned remotely from said head end; apparatus comprising, in combination, a first wall structure defining an elongated stud recess having an open mouth at the positioning surface of the tool which is adapted to rest against the hard material, said tool also having a second wall structure integral with said first wall structure to define an elongated ram recess in axial alignment with said stud recess and with an opening at the end thereof opposite said positioning surface, a ram positioned within said ram recess, said ram having a stud-striking surface serving as the inner end of said stud recess and also having an impact end projecting from said ram recess adapted to be struck to impart impact action to a stud within said stud recess, said positioning surface being formed with a washer-engaging recess aligned with said open mouth of said stud recess and immediately adjacent the lower end of said mouth, at least a portion of said washer-engaging recess being larger in cross-section than said open mouth and arranged to grip and support the guide washer on the end of said stud to maintain said washer and the shank of said stud laterally fixed in position during a driving operation.

11. In a tool of the character described for driving studs into a hard material, a first wall structure defining an elongated stud recess having an open mouth at the positioning surface of the tool which is adapted to rest against the hard material, said positioning surface being formed by a wide flat base surrounding said open mouth of said stud recess at the lower end of said first wall structure to prevent tilting movement of said first wall structure, said tool also having a second wall structure integral with said first wall structure to define an elongated ram recess in axial alignment with said stud recess and with an opening at the end thereof opposite said positioning surface, a ram positioned within said ram recess, said ram having a stud striking surface serving as the inner end of said stud recess and also having an impact end projecting from said ram recess adapted to be struck to impart impact action to a stud within said stud recess, said stud recess providing an open passageway there-through for the movement of said stud striking surface of said ram down to the open mouth of said stud recess, said second wall structure presenting guiding surfaces for said ram spaced along the axis of said ram recess, said guiding surfaces being effective to guide said ram during the movement of its stud striking surface substantially through said stud recess, said stud recess being adapted to receive a stud which is supported and guided solely at two zones one of which is adjacent the open mouth of said stud recess and the other of which is adjacent said stud striking surface of said ram, the guiding at said one zone adjacent the open mouth of said stud recess being provided by guide means comprising a member extending horizontally inwardly to fit about and engage the shank of the stud to hold it firmly in place during a driving operation.

12. In a tool of the character described for driving studs into a hard material, a first wall structure defining an elongated stud recess having an open mouth at the positioning surface of the tool which is adapted to rest against the hard material, said positioning surface being formed by a wide flat base surrounding said open mouth of said stud recess at the lower end of said first wall

structure to prevent tilting movement of said first wall structure, said tool also having a second wall structure integral with said first wall structure to define an elongated ram recess in axial alignment with said stud recess and with an opening at the end thereof opposite said positioning surface, a ram positioned within said ram recess, said ram having a stud striking surface serving as the inner end of said stud recess and also having an impact end projecting from said ram recess adapted to be struck to impart impact action to a stud within said stud recess, said stud recess providing an open passageway therethrough for the movement of said stud striking surface of said ram down to the open mouth of said stud recess, said second wall structure presenting guiding surfaces for said ram spaced along the axis of said ram recess, said guiding surfaces being effective to guide said ram during the movement of its stud striking surface substantially through said stud recess, said stud recess being adapted to receive a stud which is supported and guided solely at two zones one of which is adjacent the open mouth of said stud recess and the other of which is adjacent said stud striking surface of said ram, the guiding at said one zone adjacent the open mouth of said stud recess being provided by contact with rigid guide means extending between the shank of the stud and the lower end of said first wall structure, said rigid guide means being essentially unyielding in a lateral direction with respect to the stud axis to permit the stud to be driven into hard material such as concrete or steel.

13. A tool as claimed in claim 12 for use in driving a stud the head of which is formed with conical centering surfaces, the stud-striking surface of said ram being provided with a conical recess to receive and guide the head of said stud, said conical recess being congruent with and adapted to mate with the conical centering surfaces of said stud head.

14. In a tool of the character described for driving studs into a hard material, said studs having an elongated shank with a pointed tip at one end and a driving head at the other end, the head end being greater in cross-section than the shank and the shank carrying a tight-fitting washer near the pointed tip thereof; a first wall structure defining an elongated stud recess having an open mouth at the positioning surface of the tool which is adapted to rest against the hard material, said open mouth being at least as wide as the head end of the stud, said tool also having a second wall structure integral with said first wall structure to define an elongated ram recess in axial alignment with said stud recess and with an opening at the end thereof opposite said positioning surface, a ram positioned within said ram recess, said ram having a stud striking surface serving as the inner end of said stud recess and also having an impact end projecting from said ram recess adapted to be struck to impart impact action to a stud within said stud recess, said stud recess providing an open passageway therethrough for the movement of said stud striking surface of said ram down to the open mouth of said

stud recess, said second wall structure presenting guiding surfaces for said ram spaced along the axis of said ram recess, said guiding surfaces being effective to guide said ram during the movement of its stud striking surface substantially through said stud recess, said stud recess being adapted to receive a stud which is supported and guided solely at two zones one of which is adjacent the open mouth of said stud recess and the other of which is adjacent said stud striking surface of said ram, the lower end of said first wall structure in the first of said zones being in engagement with the periphery of said washer and maintaining the shank of the stud axially aligned with said stud recess, said stud head being free to pass through said open mouth of said stud recess.

15. A hand-held tool adapted to drive a fastener of the type including an elongated shank with a pointed tip at one end and a driving head at the other end and wherein the head end is formed with shaped centering surfaces which in longitudinal section through the fastener slope towards the axis of said shank, said fastener shank carrying a washer adjacent the pointed tip thereof; said tool comprising, in combination, means including a tubular member, a ram slidable within and guided in a straight line path by said tubular member, said ram having an impact-receiving end and a fastener striking end, the base of said tool having an opening therein communicating with the striking end of said ram, said ram being provided with a recess to receive the head end of said fastener, the side walls of said recess forming guiding surfaces which slope interiorly from the extremity of said striking end towards the axis of the ram, said guiding surfaces being congruent with the shaped centering surfaces of said fastener and arranged to mate therewith during a driving operation, the side walls of said tubular member adjacent said base being engaged with the periphery of said washer to maintain the shank of the fastener laterally fixed in position while said washer contacts and guides said shank during a driving operation.

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