A. ADVANCING A SCREW STRIP WITHIN A ROTATING BARREL

B. RADIAL LOCKING SAID SCREW STRIP

C. URGING THE ROTATING SCREW STRIP OUTWARDLY OF SAID BARREL AND AGAINST A SURFACE TO BE PENETRATED

D. SHEARING THE LEAD SCREW FROM SAID SCREW STRIP

E. RELEASING RADIAL LOCKING OF SAID SCREW STRIP AND READVANCEING, ETC...

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METHOD FOR DRIVING SCREWS

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Previous inventors, notably Ptak 2,820,972 and British 650,741 have devised flat stock or pistol type screws which are continuously formed from a flat bar stock or round wire.

Although these inventors have provided for a relative inexpensive formation of such screws, a method for efficiently driving such screws has not yet been devised.

According to the present method, a "screw strip" of threaded screws integrated in end to end relationship is developed according to applicant's Patent 3,127,625, entitled, Method For Forming Screws from Flat Bar Stock, issued April 7, 1964. The screw strip may contain any desired number of screws, which have a simple head without special notches or screw-driving slots.

A strip of such screws is axially advanced within the rotating barrel of the screw driving gun and a locking force is applied radially against the screw strip so as to induce rotation of the screw strip with the barrel. In turn, the rotating screw strip is axially advanced so that the lead screw is presented outwardly of the barrel and against a surface to be penetrated. The rotation of the screw strip causes the lead screw to drive itself into the desired surface and to shear from the screw strip as the lead head screw is secured firmly against the surface to be penetrated. The radial locking force may then be withdrawn and so as to relieve the screw strip rotation, then re-applied as the screw strip is again axially advanced for driving of the next screw in line.

Significantly, there is eliminated any necessity for centering or indexing of the screw strip as in the process to be driven. This results in an economy in production of the screw, as well as the screw driving gun. It will be seen that the present method of driving screws can be widely utilized in industrial application where appearance is not a factor, for example in the installation of TV set, refrigerator, home dryer and washer and many automotive components.

Accordingly, it is an object of invention to provide a method of driving screws independently of their head formation.

Another object of invention is to provide a method for driving and separating a lead screw from a screw strip.

Yet, additional objects of invention will become apparent from the ensuing specification and attached drawings wherein:

FIG. 1 is a schematic view of the steps of the present method;

FIG. 2 is a side elevation, partially in section showing a possible gun construction for carrying out the present method;

FIG. 3 is exploded perspective of the rotating barrel within the gun;

FIG. 4 is a vertical section taken along section line 4--4 of FIG. 2; and

FIG. 5 is a fragmentary perspective showing a strip of individual screws having shank 90, head 88 and threads 86, the screws being integrated in end to end relationship as a screw strip 87 and driven according to the present method.

In FIG. 2, screw driving gun 10 is illustrated as comprising housing 9 which may be molded integrally with handle 12. Housing 9 includes a muzzle 14 through which extends rotating barrel 26. Rotating barrel 26 has a screw strip entry port 106 and a keyhole piece 96 connected inwardly of barrel 26 by means of flanges 98. Barrel 26 has upper and lower opposed longitudinal slots 62 and 64. Barrel 26 is rotated by means of motor 34, powered through power cable 44 and driving shaft 36 in support bushing 38. End plate 100 containing power cable bushing 104 may be mounted in handle 12 by means of screws 102. Miter gear 122 attached to the end of shaft 36 engages gear 30 which is secured about barrel 26. A micro limit switch 46 embodying coil spring 48 and push trip 50 may be employed to turn motor 34 and off as trigger 16 is pivoted. Locking sleeve 28 is supported about barrel 26 and includes opposed apertures 66 and 68. Locking jaws 70 and 72 having flanges 76 and forwardly angled teeth 73 extend radially through openings 66 and 68 as well as corresponding barrel openings 62 and 64. A pair of annular springs 78 and 80 are used to urge jaws 70 and 72 inwardly of sleeve 28. The unnumbered apertures in jaws 70 and 72 are not functional but were necessitated for handling in heat treating of the jaws. Teeth 73 being angled forwardly lock the individual screw threads 86 and cause axial advancement of the screw strip 87 as sleeve 28 is axially advanced.

At the introductory end of sleeve 28 flanges 52 define track 54 in which yoke 22 having wheels 24 is engaged upon pivoting of trigger 16. Coil spring 18 is provided at the point of pivot of trigger 16 within the gun handle aperture 20. As trigger 16 is closed against gun handle 12 micro limit switch 46 is tripped causing the barrel 26 to rotate and simultaneously locking sleeve 28 is axially advanced. Jaws 70 and 72 thus axially advance with screw strip 87 so that lead screw tip 84 is presented against a surface in which the screw is to be driven. The locking of jaws 70 and 72 about screw threads 86 and the encompassment of keyhole piece 96 induce rotation of the entire screw strip, the individual screw tip 84 and shank 90 working itself into the surface to be penetrated. As the screw head 88 contacts the surface being penetrated, the screw is sheared at point 94 from the succeeding screw. Trigger 16 may then be released with the result that motor 34 is stopped, barrel 26 ceases rotating and spring 18 pivots trigger 16 to urge barrel 26 to slide reversely. In reverse axial motion, jaws 70 and 72 slip over the screw threads 86 while split ring spring 82 locks the screw strip itself against reverse axial movement.

At the forward end of barrel 26 bushing 60 may be provided and at the rearward end ballbearing assembly 40 may be secured by snap ring 42. End indexing aperture 58 having a resilient, open cushion 95 may be extended to muzzle 14 by means of ring 56. According to the present method the barrel 26 is rotated and the screw strip axially advanced only upon squeezing or pivoting of trigger 16 within aperture 20 against gun handle 12. As trigger 16 is released the rotation of the barrel 26 and screw strip 87 ceases, and jaws 70 and 72 are re-engaged to re-engage the strip in preparation for another rotating axial advance of the strip as trigger 16 is squeezed. The present structure enables utilizing the open cushion 95 as the pushing surface, inasmuch as the screw drives itself once tip 84 enters the surface to be penetrated. It is believed that only 2 or 3 lbs. pressure upon the gun handle is required to initiate driving of the screw. It is estimated that screw strips of 25 to 30 screws each may be screwed within the gun and the barrel may be rotated at approximate speeds of 2600 r.p.m. The shear point of individual
screws may be determined by the speed of rotation, as well as the construction of the screw itself. It is contemplated that voltage controls may be employed to vary the motor speed and barrel rotation. Also, variously configured support cups may be employed and the guide piece keyway may be altered to fit various screw lengths and configurations. According to present method there have been driven No. 6-32 screws, formed from \( \frac{3}{8} \times \frac{1}{4} \) inch stock and having 32 threads per inch.

Manifestly, various modifications in the proposed gun structure may be employed without departing from the spirit and scope of invention, as defined in the subjoined claim.

1 claim:
A method for driving a screw strip of the type including a plurality of threaded screws integrally formed in end to end relationship, each screw having a head lying substantially in a single plane, comprising:
(A) longitudinally advancing a strip of said threaded screws attached in end to end relationship in a rotating chamber;
(B) rotating and locking said strip against reverse longitudinal movement by radially engaging the threads of at least one of said screws with means on said rotating chamber, the portion of said threads being radially engaged being normal to the screw head;
(C) urging the lead screw of said rotating strip longitudinally forward against a surface to be penetrated; and
(D) penetrating said surface with the lead screw on said strip and shearing said lead screw from the strip as the head thereof abuts the surface penetrated.

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