

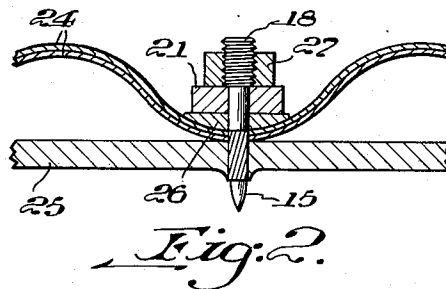
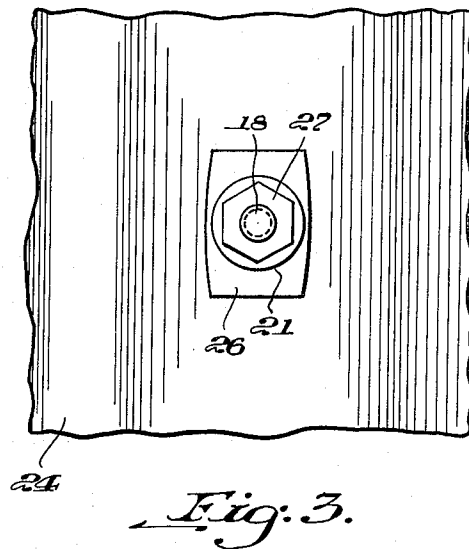
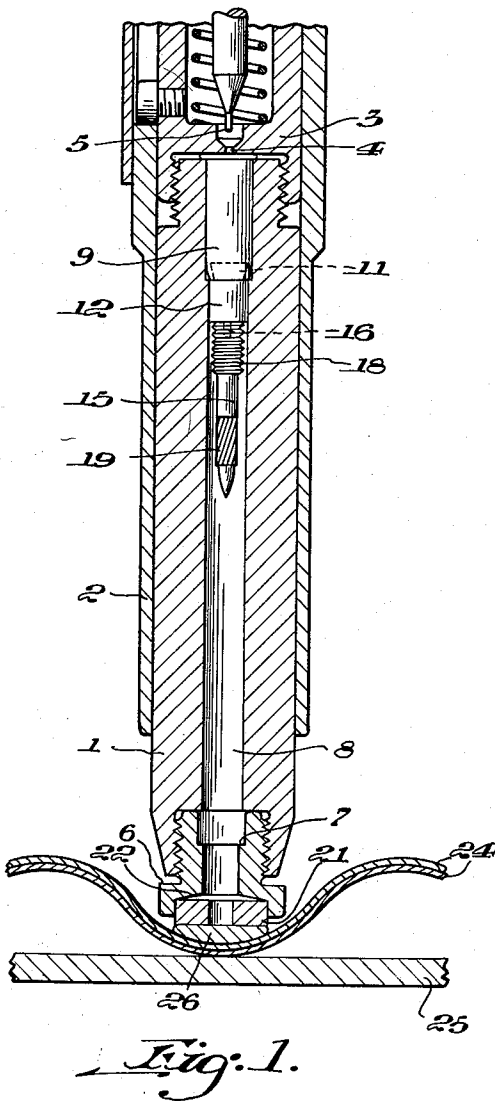
Jan. 19, 1954

R. TEMPLE

2,666,252

METHOD FOR FASTENING SHEET MATERIAL TO SUPPORTS

Filed April 20, 1949



INVENTOR.
ROBERT TEMPLE.

BY
Crown, Critchlow, Flick & Peckham
his
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,666,252

METHOD FOR FASTENING SHEET MATERIAL TO SUPPORTS

Robert Temple, Swissvale, Pa., assignor to Temple Velocity Equipment, Inc., Wilmington, Del., a corporation of Delaware

Application April 20, 1949, Serial No. 88,559

1 Claim. (Cl. 29-148)

1

This invention relates to a method and means for fastening sheet material to supports, and more particularly to such connections which are formed with the use of explosively actuated driving tools.

The connecting of two members by means of a metal stud shot into them from a gun-like tool is well known. Where the outer member is thin, under certain conditions there is a danger of the stud passing entirely through it and injuring someone on the other side. Also, where sheet material exposed to the weather is fastened to a support, there is danger of leakage of rain around the stud that extends through the sheeting.

It is among the objects of this invention to provide a non-leaking connection for fastening sheet material to a support, and which can be made by shooting a stud from a tool without danger of the stud passing entirely through the members that are to be connected.

In accordance with this invention a metal stud extends through sheet material and into a support behind it. The outer portion of the stud also extends through a soft metal sealing member that engages the outer surface of the sheet material. The stud has a head which generally more or less engages the outer face of a washer mounted on the stud in engagement with the sealing member. Engagement of the head with the washer prevents the stud from passing entirely through the sheet material in case the stud misses the support. In order to cause the sealing member to form a good weatherproof seal around the stud, a nut is screwed onto the head and turned tightly against the washer to squeeze the sealing member into sealing engagement with the sheet material. The stud is driven into the support at high velocity by being shot from an explosively actuated driving tool. The washer may be placed in the muzzle of the tool and held against the sealing member engaging the sheet material. The sealing member preferably is solid before the stud is driven through it.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a vertical section through a driving tool barrel and the members that are to be connected together by the stud shown in elevation inside the barrel; Fig. 2 is a vertical section through the completed connection; and Fig. 3 is a plan view of the connection.

Referring to Fig. 1 of the drawings, the barrel 1 of the driving tool may be of any suitable form, the one shown being a part of the tool dis-

2

closed in my copending patent application, Serial No. 34,542, filed June 22, 1948, now Patent No. 2,479,431. The barrel is mounted in a barrel guide or sleeve 2 and has a threaded rear end screwed into a breechblock 3. The breechblock is provided with an axial passage 4 through which a firing pin 5 can be projected. The front end of the barrel is formed by a muzzle cap 6 provided with an internal shoulder 7 having an inner diameter that is slightly less than the axial bore 8 through the barrel. The rear end of the axial bore is enlarged slightly to receive a loaded cartridge 9, the rim of which is clamped between the breechblock and the rear end of the barrel. The front end of the cartridge case is compressed around a forwardly tapered rear portion 11 of a one-piece piston, as shown in Fig. 2 and in my copending patent application, Serial No. 43,746, filed August 11, 1948, now abandoned. In other words, the front end of the case is tapered and engages the forwardly converging surface of the piston. The front portion 12 of the piston is cylindrical and fits slidably in the barrel directly in front of the enlarged rear end of bore 8. The cartridge contains the usual charge of powder which is detonated by the firing pin.

Attached to the front of the piston by a separable connection is a metal stud 15 which is to be driven out of the barrel and into the objects that are to be fastened together by the stud. The connection between the stud and piston preferably is a friction connection, such as is provided by a snug fit between an axial projection 16 on the front end of the piston driven into an axial opening in the rear end of the stud. This connection not only holds the stud and piston together until after the cartridge is fired, but it supports the stud in the center of the barrel spaced from the wall of bore 8, because the maximum diameter of the stud is less than that of the piston so that the stud can pass through the muzzle cap 6 when the piston is stopped by shoulder 7.

The rear end portion of the stud is enlarged to form a head 18 provided with screw threads. The front end of the stud is pointed, and the front half of the shank between the point and head is knurled so that the stud will have a better grip on the objects into which it is driven. When the stud is to be driven into metal, it is preferred that the knurls 19 extend spirally around the stud at an angle of about 30° to the stud axis. After the barrel has been loaded with the stud a heavy metal washer 21 is inserted in a socket 22 formed in the outer end of the muz-

3

zle cap. When the barrel is held vertical, the washer can be held in the socket by a little grease first applied to the washer. The washer preferably projects from the socket.

This invention is especially applicable to the fastening of sheet material to the outside of supporting members. For example, corrugated metal sheets 24 can be secured to vertical or horizontal metal supports 25 which may be bars, channels or I-beams. When the sheets are used for roofing, as shown in Fig. 1, they are laid on the spaced supports, and soft metal sealing members 26 are placed on top of the sheets directly above the supports. The sealing members, preferably made of lead, are placed in the valleys of the corrugated sheets, and preferably have transversely curved lower surfaces to conform to the adjoining curved surfaces of the sheets. The sealing members are substantially rectangular when viewed from above before they have been fastened in place.

As shown in Fig. 1, the washer 21 in the lower end of the driving tool is placed against the top of a sealing member 26, and then firing pin 5 is driven down against the cartridge in order to detonate it. The piston and stud will be driven ahead as soon as the gases resulting from the explosion in the cartridge build up a high enough pressure behind the piston to enable its flaring rear end to move forward and expand the reduced front end of the case into the enlarged portion of the barrel bore. This results in the piston and stud having a high velocity from the moment that they leave the cartridge. The piston will strike the muzzle cap shoulder 7, but the inertia of stud 15 will cause the stud to separate from piston projection 16. The stud is driven in this manner through the washer, sealing member 26, sheets 24 and the metal support 25 until the head of the stud strikes the top of the washer, as shown in Fig. 2. If the stud accidentally misses the support, by being too far to the side, there will be no danger of the stud passing completely through the corrugated sheets because the washer will serve as an enlarged head that will prevent such a thing from happening. The washer thus serves to limit penetration of the stud into whatever material it is driven.

Although the stud normally is shot out of the tool with sufficient force to cause its head to jam the washer down against the lead sealing member and thereby squeeze the latter between the washer and corrugated sheet, a good seal generally will not be formed unless a nut 27 is screwed on the threaded head of the stud and

4

turned down tightly against the washer to cause it to press the sealing member into sealing engagement with the corrugated sheet. As shown in Figs. 2 and 3, this will tend to spread the central portion of the sealing member laterally. It also will cause the lead seal to seal any crack that otherwise might exist between the stud and the wall of the hole it pierced through the metal sheet.

According to the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claim, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

The method of fastening sheet material to a solid support, comprising placing a solid soft metal sealing member against the side of said material opposite to said support, placing a large diameter heavy metal washer against the exposed side of said member, shooting a stud with a small diameter threaded head into the washer and sealing member and sheet material and said support far enough for the head to substantially strike the outer face of the washer, and then screwing a nut on said head and tightly against the washer to hold the sealing member in sealing engagement with said sheet material, the washer forming an emergency large head for the stud if the shooting stud accidentally misses said support, whereby the washer will prevent the stud from passing entirely through the sealing member and sheet material.

ROBERT TEMPLE.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,365,869	Temple	Jan. 18, 1921
1,365,870	Temple	Jan. 18, 1921
1,652,648	Swangren	Dec. 13, 1927
1,984,117	Davis	Dec. 11, 1934
2,050,047	Febrey	Aug. 4, 1936
2,166,041	Cox	July 11, 1939
2,253,916	Richardson	Aug. 26, 1941

FOREIGN PATENTS

Number	Country	Date
105,560	Great Britain	of 1919
636,479	Germany	Oct. 9, 1936
534,177	Great Britain	Jan. 8, 1947