Ed

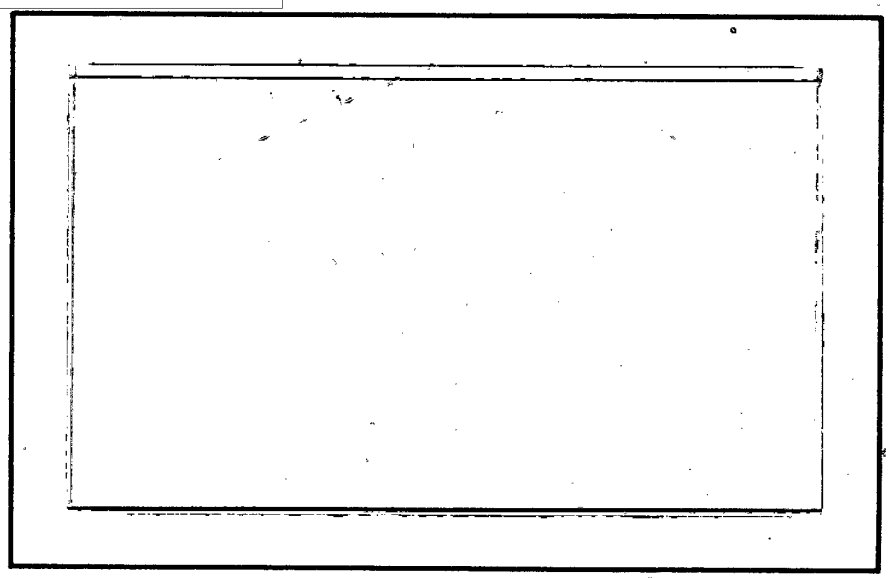
You have the folder for this Box - Folder 10

CONFIDENTIAL

~~SECRET~~

Original Lpts. File
Extra Copy

EBITS: I



JOB NO. 78-03624A

BOX NO. 9

FOLDER NO. 11

TOTAL DOCS HEREIN 1

CONFIDENTIAL

RETURN TO ARCHIVES & RECORDS CENTER
AUTOMATICALLY RETRIEVED
JOB 78-3624 BOX 9

~~SECRET~~

211431

~~SECRET~~ CONFIDENTIAL

#10

SUMMARY LETTER REPORT

ON

TASK ORDER NO. VV

April 14, 1961

CONFIDENTIAL

~~SECRET~~ CONFIDENTIAL

50X1

November 29, 1961

Dear Sir:

This summary letter report describes the effort performed on Task Order No. VV from November 14, 1960, through April 14, 1961.

The objective of this program was to develop a corner-drilling attachment which could be mounted on the modified version of the drilling unit evolved previously under Task Order No. 0, and which would permit the use of both 3/8- and 1-inch-diameter drills on the basis of the new drill-attachment arrangement.

Introduction

Under Task Order No. 0, a drilling unit was developed to facilitate the drilling of 5/16-inch-diameter holes in masonry-type building materials. Under Task Order No. BB, an attachment was evolved for drilling 3/8-inch-diameter holes in locations close to abutting surfaces, without interference from the drilling unit. As a result of subsequent experience with the drilling unit, you and your associates made selected modifications to the unit. A cover was placed over the front of the drilling unit to prevent water from splashing into the motor, rectifier assembly, and bearings. In addition, the motor-armature-shaft adapter which had been used to hold the drills to the armature shaft was redesigned to provide for a new method of attaching the drills. It was subsequently found that the cover prevented the corner-drilling attachment from being fastened satisfactorily to the drilling unit; and, also, that the

small shaft of the attachment could not accommodate the new drill-fastening arrangement. Further, it was decided that provision should be made for the corner-drilling attachment to be capable of being used with a 1-inch-diameter drill.

In view of the above, you requested that consideration be given to the development of a corner-drilling attachment which could be mounted on the modified drilling unit, and which would permit the use of both 3/8- and 1-inch-diameter drills with the redesigned motor-armature-shaft adapter. Task Order No. VV was initiated on November 14, 1960, to design, develop, and prepare an experimental version of such an attachment.

Summary

A corner-drilling attachment was designed and developed that satisfied the above-indicated requirements. An experimental version of the attachment was evaluated in our laboratories; it operated quite well.

The experimental attachment, together with an alternate sheet-metal housing, was submitted to you for further evaluation. You subsequently indicated that the experimental unit functioned satisfactorily.

Engineering Activity

Design Considerations

Hose. In the original corner-drilling attachment which was satisfactory for use with 3/8-inch-diameter drills, a specially prepared flexible hose had been used to transmit torque and water from the armature shaft to the

drills, located at a 30-degree angle to the armature shaft. The general configuration was the same as that (of the modified attachment) shown in Figure 1. The diameter of the hose was limited by the diameter of the mounting for the 3/8-inch-diameter drill, because it was desirable to locate the drilled hole as close to the abutting walls as possible. In view of the limited diameter and the need to transmit adequate torque, it had been necessary to resort to the use of a custom-made hose for the original attachment.

Because the attachment of interest was to accommodate 1- as well as 3/8-inch-diameter drills, it appeared quite feasible to use a hose of larger diameter; an appreciation of this can be obtained by examining the front end of the unit in Figure 1. Consequently, the chances seemed good that a standard hose of some type could be found that would transmit the torque satisfactorily. In this connection, on the basis of data from our previous work, it was known that the drill motor had a stall-out torque of 4 inch pounds.

An examination of available commercial hoses showed that the following types appeared promising:

(1) A single-cotton-braid, 250-psi, air hose, with a 5/8-inch OD.

(2) A single-wire-braid-reinforced, 3,000-psi, hydraulic hose, with a 0.516-inch OD, and a cotton cover, impregnated with synthetic rubber.

(3) A single-wire-braid-reinforced, 3,000-psi, hydraulic hose, with a 0.516-inch OD and a rubber cover.

The over-all length of the corner-drilling attachment is shortened when the angle between the motor-armature shaft and the drill (in position)

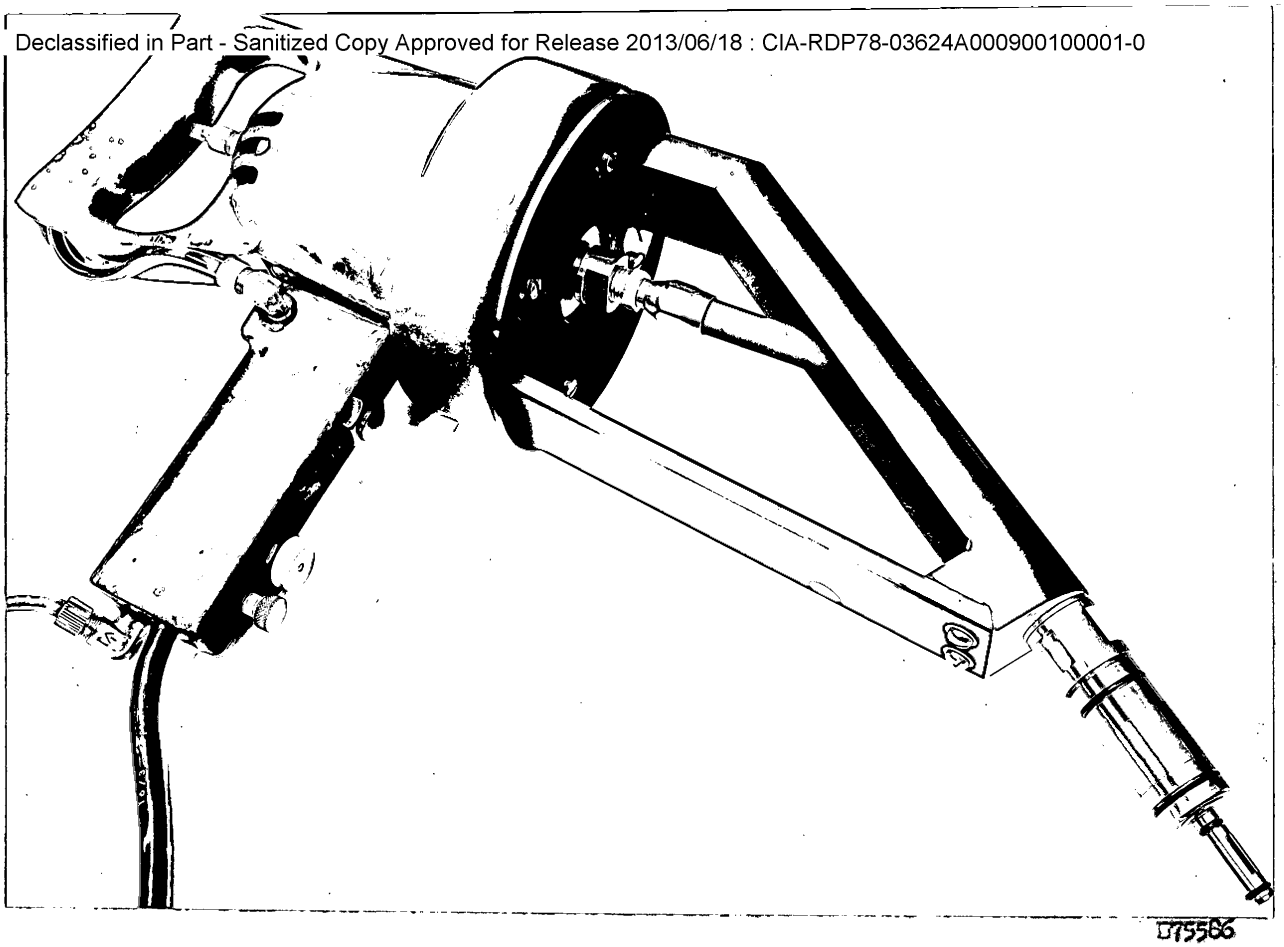


Figure 1. One Version of Experimental Corner-Drilling Attachment, Joined to Drilling Unit With Four Screws

is increased; however, an increase in this angle also results in the hose being bent to an increasing extent. An increase in the angle of bend of the hose not only reduces the operating life of the hose, but also requires the use of more power to rotate the hose. In view of the low weight requirement, the drilling unit had a power capacity such that most of the power of the small motor was needed for drilling.

Dynamometer tests were made on the three types of selected hoses to determine the power required to turn the hoses while bent at different angles and to evaluate the effect of different bend angles on the life. The single-cotton-braid hose was not able to transmit sufficient torque at any significant hose-bend angle, and this hose was considered to be unacceptable. Both types of hydraulic hoses were tested at bend angles of 20, 30, 35, 40, and 45 degrees (from a straight line representing the hose before bending). They were found to have adequate life and to require a suitably small amount of power when they were operated at bend angles up to and including 35 degrees. After 100 hours of running at a bend angle of 35 degrees, the two types of hydraulic hoses were pressure tested at 300 psi and found to be satisfactory.

Housing. It appeared that the housing of the modified corner-drilling attachment could be very similar to that of the original unit, except for two features, namely, the method of attachment to the drilling unit, and the method of using the motor-armature-shaft adapter which had been redesigned by you. After some consideration, it was decided that the improved corner-drilling attachment could be fastened to the drilling unit by means of the screws which were used to hold the new cover in place. Figures 1 and 2 show two versions of the improved attachment unit held in place on the drilling unit by means of four

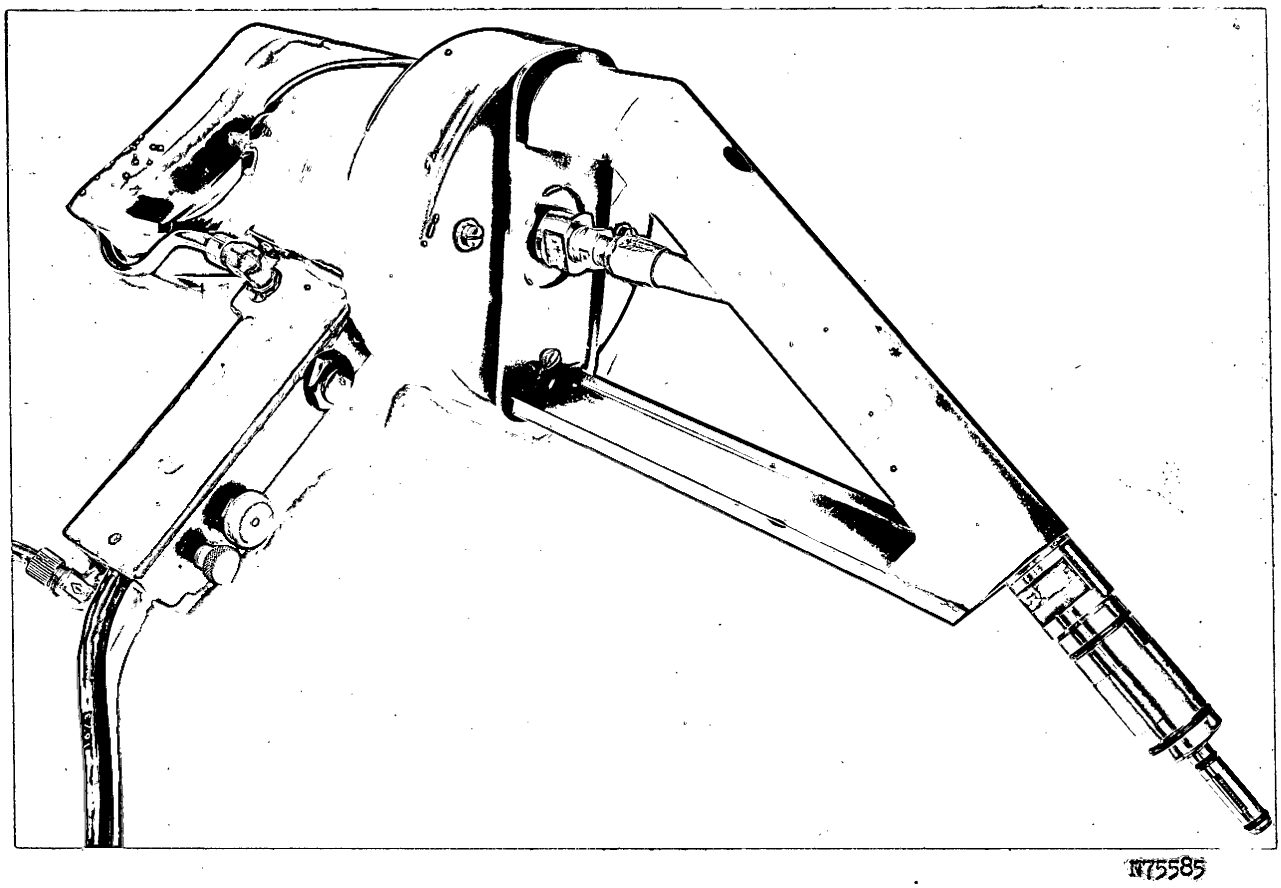


Figure 2. Alternate Version of Experimental Corner-Drilling Attachment, Joined to Drilling Unit With Two Screws

and two screws, respectively. Both types of sheet-metal housings as shown were prepared because, while it was obvious that the unit involving two screws would be desirable in view of its smaller base size, it was not known whether the two screws would provide a solid enough mounting.

The use of the new motor-armature-shaft adapter actually made the improved corner-drilling attachment simpler than the original unit. The original attachment had its own drill adapter mounted permanently in the housing, but the improved attachment was designed with only a bearing built into the housing. Thus, when it is desirable to use the improved corner-drilling attachment, the motor-armature-shaft adapter is removed from the drilling unit and inserted into the attachment bearing; the hose is then connected, at one end, to the motor-armature shaft and, at the other end, to the re-positioned adapter. The various parts of the modified corner-drilling attachment are illustrated in Figure 3; both the four-screw and the two-screw housings are shown.

Experimental Model

On the basis of the information gained under Task Order No. BB, the design thinking described above, and the data from the hose tests, the experimental attachment as shown in Figure 1 was fabricated. To attach the unit, the sheet-metal-housing portion is joined to the drilling unit by the four screws which previously held the cover in place; the attachment is mounted by loosening the cover screws, placing the large holes in the circular sheet-metal base over the screw heads, rotating the circular base until the small slots are under the screw heads, and then tightening the screws.

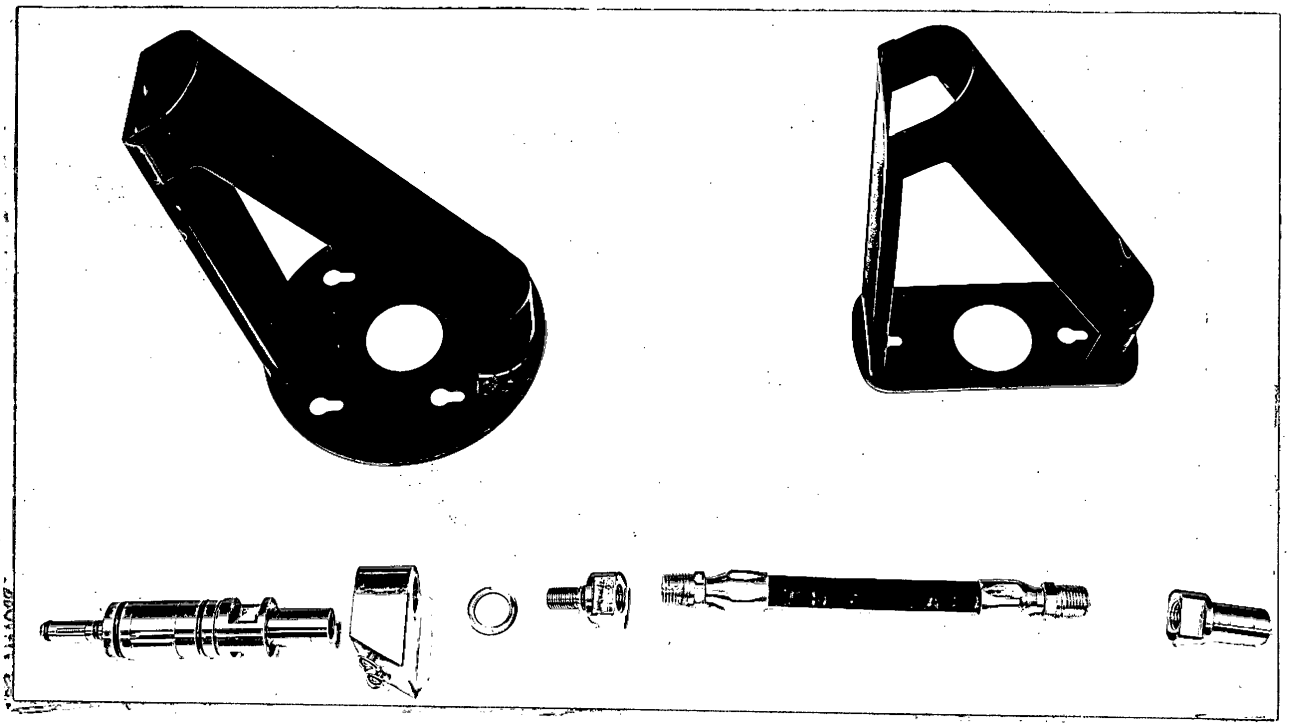


Figure 3. Parts of Modified Corner-Drilling Attachment, With Four-Screw and Two-Screw Housings Shown

The sheet-metal housing contained a bearing, shown in Figure 3, which positioned the axis of the motor-armature-shaft adapter at an angle of 35 degrees to the motor-armature axis. Two fittings, also shown in Figure 3, adapted the standard hose assembly to the motor-armature shaft and to the motor-armature-shaft adapter. Because of the advantage of keeping the attachment as short as practicable, a hose-bend angle of 35 degrees was utilized.

Because the circular base of the sheet-metal housing would not fit readily into the carrying case for the drill kit, another sheet-metal housing was prepared. This had a smaller base and used only two screws for mounting to the drilling unit; and would fit into the carrying case. The use of two screws appeared to provide satisfactory joining. However, this arrangement necessitated the drilling unit being held at a different angle during corner drilling than was the case when the four-screw housing was used; this difference in position can be visualized by comparing Figures 1 and 2.

Evaluation

The experimental attachment unit was evaluated in our laboratories; when equipped with either the four-screw or two-screw housing, it was judged to be satisfactory for drilling 3/8- and 1-inch-diameter holes. The two types of housings and the other components were then submitted to you for further evaluation.

You subsequently indicated that both housings were satisfactory but that the two-screw housing was preferred because of its smaller size; and that the entire unit operated well, except for a reduction in the power available for drilling that was noted during operation. We suggested that the diameter of the large end of the armature-shaft adapter be checked. It was

felt that if this dimension was correct, there would be no binding of this adapter in the bearing of the attachment, and consequently, no reduction in power during drilling.

Future Work

No future work is currently contemplated in connection with the corner-drilling attachment.

We would appreciate any comments which you or your associates might care to make in regard to our efforts under Task Order No. VV.

Sincerely,

50X1

ABW:mlm

In Triplicate

SECRET

CONFIDENTIAL

SECRET