the counterſcarp and the depth of the ditch : ſo that if the distance from the entrance of the gallery to the border of the counterſcarp is four times as much as the depth of the ditch ; then for every four feet advanced horizontally towards the ditch, there must be one sunk perpendicularly, &c. When the ditch is not deep, as of 12 or 15 feet deep, instead of a gallery under ground, the descent is made by a sap only, which cuts the parapet of the covert-way, and sinks therein as deep as is neceſſary for the deſcent to terminate at the bottom of the ditch. This sap must begin at the lodgment on the ridge of the glacis ; it is ſecured on both sides with blinds, to ſupport the earth, and it must have a good epaulement on the side exposed to the place. Above it is covered with faſcines and with earth, to avoid the shell-stones and grenades that may be thrown in by the enemy. Upon ad­vancing to the foot of the counterſcarp, an entrance is made into the ditch. There are generally two or three deſcents made for the same passage of the ditch, near enough to ſup­port each other for greater ſafety.

It is in the passage of the dry ditch that the enemy has the advantage in making uſe of various artifices to retard it. In theſe they are chiefly assisted by their miners, who blow up the saps by means of ſmall mines, and ſally out at the same time, neglecting nothing that can delay the progreſs of the work. They may likewiſe order 12 ſoldiers to fall at once upon the head of the sap : this number is ſufficient to drive away the ſappers, and to do ſome damage to that work. A few companies of grenadiers ſhould be placed near at hand, to attack theſe men as ſoon as they appear ; and the cannon must be kept continually firing against every part, from whence the enemy may possibly ſally out. As the batteries of the covert-way command all their communi­cations, they may destroy them, or at least render them very dangerous.

In order to protect the sap at the bottom of the ditch, the besiegers may likewiſe make uſe of a kind of ſmall gal­leries behind the counterſcarp, near the place where the en­trance is effected ; and they may pierce ſome loop-holes, from whence the enemy may be fired at, and a check put to their sallies, at least by day : and in regard to night, the besieged ought to be more circumſpect than by day, since they can neither see the diſpositions nor the troops that are ordered into the ditch to ſupport the ſappers ; ſo that they can only raiſe a false alarm, without doing any great miſchief. Yet we must obſerve, that this passage can be made only ſo far as it is protected by the battery placed on the ridge of the parapet of the covert-way oppoſite the ditch : for as the cannon of this battery keeps continually playing against the defences of this ditch, they must ruin them of courſe, and destroy their parapet, ſo that the enemy ſhall no longer be able to keep any cannon there ; the conſequence of which will be, that the besiegers have only to screen themſelves from muſket-ſhot, which is an eaſy matter.

The passage of the ditch is made on each side of the faces of the half-moon, as may be ſeen in *m, m, fig.* 6. Plate DXXXIII.

If the ditch is full of standing water, and the ſurface of it be raiſed to three, four, or five feet, below the upper bor­der of the counterſcarp, the descent will be easier ; becauſe as the steps are to have but a very ſmall slope, they may begin nearer the border of the ditch, as in the lodgment on the ridge of the glacis, and be directed in ſuch a manner as to terminate at the ſurface of the water. They are to be covered on The side expoſed to the place, and strongly ſecu­red with blinds, placed within five or six feet of each other. Blinds are likewiſe to be laid over the deſcent, which is to be covered with faſcines, and theſe with earth, to prevent the enemy from ſetting them on fire.

Tn order to paſs this ditch, a bridge must be made with faſcines ; for which end, after breaking the counterſcarp, a number of men, ſufficient to occupy the whole length of the deſcent, are ranged at the distance of two feet from each other : theſe men must be covered by the parapet, and to forward the faſcines from hand to hand, from the head of the passage to the opening into the ditch. The sapper in this part (for all theſe works relate to the ſappers) will throw them into the ditch, in order to make an epaulement or covering on that side of the town which looks towards the passage.

As ſoon as he has flung in a ſufficient number of faſcines to ſhelter himſelf, and to advance a few paces into the ditch, he must throw a great number of them into the paſſage, in order to fill the ditch up entirely in that part. They are laid different ways, and ranged in different beds ; which are covered with earth, in order to make them sink to the bottom. All theſe different beds of faſcines must be fixed with long stakes, that they may keep cloſer together ; and as the work advances, the parapet must be pussed for­ward, otherwiſe it would be impossible to effect the passage without the utmost danger.

When the passage is commanded, or fired into from the oppoſite parapet of the place, or from any other part, the foremost men must be covered with a great heap of faſcines, or by ſome other contrivance ; but whatever cover it be, in that case the passage of the ditch is extremely difficult and dangerous.

After what has been ſaid concerning the passage of dry ditches, and thoſe which are full of standing water, it re­mains to take notice of thoſe which are full of running wa­ter, and thoſe that are dry but may be filled at any time with water. Theſe sorts of ditches are extremely difficult to pass, unleſs the current can be turned and made to take a different courſe from that which carries it to the town ditches, or unleſs the besiegers can contrive to break down the sluices which keep up the water reſerved by the enemy for filling the ditch.

A great deal might be ſaid, were we to enter into the whole detail of the works necessary for passing theſe sorts of ditches ; we ſhall only touch upon the subject.

Supposing the ditches to be filled with running water, or with a river, the channel of which can be diverted no other way, which is called *draining the ditch,* it will be requisite then, generally speaking, to throw into the ditch a large quantity of faſcines, loaded with earth and stones, fa­ttened together with long stakes : thus the passage is to be pushed on, till the ditch is contracted to the breadth of 20 or 30 feet ; and then ſmall beams may be laid acroſs, to join the bridge of faſcines to the rubbish of the breach. The filling up, and conſequently the passage of the ditch, may be also forwarded, by ordering the miners to advance to the rubbiſh, and to ſpring a mine, in order to blow up part of the revetement of the work into the ditch.

Should the enemy happen to have reſervoirs of water which they may open, and thereby destroy the lodgments in the ditch when they are no longer to make a stand there, the besiegers must endeavour during the siege to destroy the sluices, that is, the stone-work or timber that ſerves to keep up the water. This may be done by throwing a great number of bombs towards that part where the sluices are known to be situated ; if they ſhould be broke down by that means, then the water will have a free current ; and after it has run off, the passage of the ditch must be attempted in the same manner as if it was standing water ; if there remains only a very ſmall current, a passage must be left to drain it, as was mentioned before.

This whole operation is very tedious, difficult, and dan­-