on the covert-way oppoſite those parts. They are marked on the plan *e, e,* Batteries must be alſo erected to make a breach in the half-moon. But before they are erected, it will be proper to conſider what part of the face of the half­moon is to be attacked ; or, which is the same thing, what part the half-moon is to be entered. It must not be at its flanked angle, becauſe an opening towards the point would not afford a ſufficient ſpace to make a lodgment able to withstand the enemy, and moreover the troops would be ſeen in their passage by the two faces of the bastions by which its flanked angle is defended. The most favourable passage is towards the third part of its face, reckoning from its flanked angle ; becauſe by battering at the same time the two faces near this part, the whole point of the half­moon may be destroyed, and a large opening made there eaſier than anywhere elfe. Thus the batteries for making a breach in the half-moon C will be placed in *d* and d, and will occupy almost the third part of each of the faces of the half-moon from its flanked angle. Theſe batteries are each to consist of four or five pieces of cannon.

When the faces of the bastions A and B are well enfi­laded by the ricochet batteries, there will be no occasion for the batteries *e* and *e ;* for thoſe which are to batter the half-moon in breach will be ſufficient ; and after it is taken, if there is any necessity for ruining the faces of the bastions A and B, you may make use of the batteries *d* and *d,* by placing them in *e, e.* Batteries must alſo be erected to ruin the flanks of the demi-bastions in the front of the attack. It is evident that they cannot be placed but in *i, i,* on the covert-way oppoſite to them. They ought alſo to contain as great a number of guns as the ſpace of ground will permit.

For the same reaſon that batteries have been erected to make a breach in the half moon, oppoſite the third part of the face joining to its flanked angle, thoſe also are to be erected which are to make a breach in the bastions ; they are marked h, *h,* and are each of ſeven or eight pieces of cannon. Batteries are likewiſe erected to ruin the flanks of the demi bastions bordering upon thoſe of the front at­tacked, in order to favour the passage over the ditch which is made on the side, upon a ſupposition that the bastion is entered at both faces, as we ſuppoſe in this example. The attacking both faces of the bastion renders the taking of it more certain and eaſy ; but, generally ſpeaking, it is looked upon as ſufficient to make only a breach in the face of the earth of the demi-bastions towards the front attacked.

Beſides all theſe batteries, others are erected in the re­entering places of arms of the covert-way, as in *k,* and in *k;* they ſerve to batter the tenaille when there is one, the cur­tain, and the faces of the bastions, &c. Sometimes they are of mortars for throwing of stones.

All theſe batteries ſhould have 24 pounders ; ſometimes larger pieces are uſed, eſpecially when there is any work of extraordinary strength and ſolidity to be demolished.

They are all to be placed on the parapet of the covert­way ; and the outside of their epaulement is to graze the inside of the covert-way. It is in order to have room enough for this epaulcment, that the lodgment is made on the ridge of the glacis at the distance of three fathoms from the inside of the covert-way.

The only essential thing to be obſerved in theſe batteries, is to open their embraſures, ſo that they ſhall perfectly diſ­cover every part of the place they are to batter, and have a ſufficient sloping from the back to the fore-part, to fire as low as the bottom of the revetements @@(c), which they are intended to destroy. It is alſo proper to prevent the enemy’s blowing them up with mines : for this end it will be requisite to dig wells deep enough round the batteries, ſo as to be ſure of being lower than the enemy, and to make ſmall galleries round the batteries, in order to diſ­cover the branches the enemy have underneath to blow them up.

As the construction of this sort of batteries is very dan­gerous, being abſolutely to be made under the fire of the rampart of the place, they are ſometimes maſked ; that is, before the part where they are erected, sand-bags or ſome other materials are placed, with a view to ſhelter the work­men from the enemy.

In order to batter in breach, all the guns ſhould fire to­gether, and towards the same part. They ſhould fire as low as they can, and continue to batter the same part, till the earth of the rampart behind the revetement begins to fall, which is a sign that the revetement is entirely destroyed. This united firing, repeated in this manner against the same place, is productive of a much better effect than if the guns were to be fired one after the other ; for not only a greater quantity of the wall is ſhaken at the same time, but, moreover, the ſhaking is far more considerable.

14. *Of the deſcent, and passage over the Ditch of the Half­-moon.*

While the batteries on the covert-way are erecting, pre­parations are made for the deſcent and passage over the ditch of the half-moon.

The ditches are either dry, or filled with water, which may­be either stagnated, or running; and even into dry ditches the enemy may let in water, only opening the sluices by which it is withheld. Each of theſe sorts of ditches requires a different manner of passing.

First of all, if the ditch be dry, and very deep, as from 25 to 30 feet, the deſcent may be made by one or ſeveral ſubterraneous galleries, passing under the covert-way, and terminating at the bottom of the ditch : the entrance is to begin about the middle of the glacis. Theſe galleries are made like thoſe of miners, and the earth is ſupported by boards and timber frames. They are directed in ſuch a man­ner, that the opening in the ditch ſhall be oppoſite to that part of the breach where the passage is intended.

As this gallery is made sloping, the busineſs is to have ſome rule for directing the slope, ſo as to prevent its being too ſmall or too great : too ſmall, if it terminated above the bottom of the ditch ; and too great, if it terminated below it.

The following is a most simple way to find it out : First: of all, it is requisite to take the depth of the ditch ; which is done by letting fall a plummet, with a firing tied to it, from the border of the covert-way to the bottom of the ditch. It is requisite alſo to know the distance from the entrance of the gallery to the border of the covert-way, which may be easily meaſured thus : Suppoſe the depth of the ditch is 30 feet, and that the distance from the entrance of the gallery to the border of the ditch is 90 feet, then by advancing six feet towards the counterscarp, the slope must sink two ; that is, there must be always the same propor­tion between the length of the passage made to approach the counterſcarp and the depth of the slope, as between the distance from the entrance of the gallery to the border of

@@@(c) The revetement is a strong wall built on the outside of the rampart and parapet, to ſupport the earth, and pre­vent it from rolling into the ditch.