the end of the trench BELT, the uſe of which is to cover the *boyau* or branch IOMG, whereby the enemy will not know the place where it falls into the trench AB, and to make room for withdrawing thoſe who are in this part of the trenches, and that the passage may be free at all the angles. In like manner produce the side GM from M to N, and the side IC from O to P, and you will have the end of the trench MNOP, which will cover the branch DCOQ. Do the same at all the angles of the trench.

The parapet of the trench being made to cover it, ought to change sides alternately. If, for instance, AE, in the preceding figure, is towards the place, it is evident that the side GN will be towards it alſo, and likewiſe the side CD ; and therefore the parapet of the trench is ſuccessively constructed from the right side to the left, and from the left to the right. In the plans of attacks, the side of the parapet of the trench, as alſo that of the parallels, are distinguiſhed by a stronger line than any of the rest ; but the latter admits of no difficulty, becauſe we may easily con­ceive that, being parallel to the place, its parapet must necessarily be on the side that faces it. Care has been likewise taken to expreſs, as we have already mentioned in the figure, the parapet of the branches, by a stronger line than the other lines of the attacks. The side of the trench op­poſite to the parapet is called the *reverse of the trench.*

The trenches are generally no more than three feet deep; and their parapet, beginning from the bottom of the trench, is six feet and a half high, or thereabouts. The parallels have a parapet like the trench, and of the same height ; but as they are intended for firing over, they are made with a kind of banquette, as may be seen Plate DXXXI. fig. 3. to raise the soldier, to the end that he may fire over the parapet. On the parapet of the places of arms are put baſkets, fascines, or ſand-bags, ranged in ſuch a manner that the troops may be able to fire without being too much ſeen by the enemy. The third parallel, or place of arms, is ge­nerally wider than the rest. Sometimes the inside of its parapet is likewiſe made with steps or banquettes, to the end that the ſoldiers may conveniently paſs over it in case of an attack. See fig. 4.

There will never be any great difficulty in tracing the attacks, from an exact plan, by obſerving the method we have made uſe of to make its parts defile properly. But the difficulty is to transfer the works from the plan to the field; for doing which the following plan has been recommended.

In the first place, the engineer must from all the angles of the branches of the trench, upon the plan, draw perpen­diculars to the produced capitals ; obſerving the distance of each of theſe perpendiculars and their length. He is then to walk about the place in the day-time, at a ſufficient distance to be without the reach of muſket-shot. It is not uſual to fire cannon against a single man, becauſe the shot is very uncertain, eſpecially against a perſon who does not stand still for any time ; therefore, without any great dan­ger, he may only keep himſelf out of muſket-shot. It is easy to diſcover the flanked angle of the bastions against which he wants to direct the attacks, and the saliant angle of the covert way oppoſite to them ; which gives two points, and theſe the direction or the prolongation of the capitals of thoſe bastions. Conſequently he has only to plant ſome picquets on the direction of theſe points, in order to have the prolongation ot the capitals of the bastions. Theſe picquets can only be put out of the reach of muſket- shot ; but by day-light he may obſerve ſomething of the ground lying in the direction of theſe picquets, and he may afterwards reconnoitre it in the evening, in order to place picquets there alſo. In this manner he may have the pro­longation of the capitals pretty exact.

In order to conduct the trench by theſe capitals, the following method has been pointed out by marſhal Vauban.

Examine upon the plan of the attacks what distance there is from the beginning of the trench to the first perpendicu­lar ; meaſure this perpendicular and the side or part of the branch correſponding to it; take cords of equal length with theſe lines, and fallen the extremities of the two cords, one repreſenting the length of the line of direction, and the other that of the branch which makes an angle with it, to a picquet at the point of the produced capital where the trench begins, and make two men walk, each of them hold­ing one end of theſe cords, viz. one in a direct line towards the place, the other alſo advancing towards the place and walking alongside of the former. When the first comes to the farthest distance betwixt the opening of the trench and the first perpendicular, he must plant a picquet on this point, to which he is to fallen the cord which expresses the per­pendicular. He must take the other end of this perpendicular, and afterwards turn off to the right or to the left, according to the side where the perpendicular ought to be, till the part of the cord expressing the perpendicular is well stretched, and joined to that end of the cord of the trench carried by the other man : at their meeting they are to plant a picquet, by means of which the triangle, thus tranſferred to the ground, will be like that which was taken upon the plan ; and this part will be traced on the ground in the same manner as on the plan. In like manner may every part be traced in the beginning, when the trench is yet at a distance from the place.

Let the trenches be traced upon the plan (fig. 2.), and let C be the place against which you are to direct the at­tacks, transferring the plan to the ground : let BG be like­wiſe equal to the line of direction of the plan ; you are to plant along this line a ſufficient number of picquets, with burning matches tied to them, in order to diſcover them the more easily.

To begin the tracing of the trenches, tie to the picquet G a cord of the length GS, and to the same picquet another cord of the length GX : let there be two men, and each take an end of theſe two cords, and let them walk, the one at a venture towards S, and the other directly to X towards the place along the line of direction BG; and having reach­ed the end of his cord, let him fallen it with a picquet, after having drawn it very straight; and to this picquet let him tie one of the ends of the cord, which is to mark the perpen­dicular XS. Let him take the other end, and walk to­wards S till his cord XS is stretched very tight, and then let him join the man who holds the end of the cord GS, and let them fasten a picquet in S, where both the cords join. Let them afterwards take away the cord XS, the perpendi­cular which is of no uſe, and the cord GS which remains will mark the real tracing of the trenches. In order to have the line ST, you come to the picquet X ; to which you be a cord of the length of XY, and another to the picquet S of the length of ST. Let two men, as before, take each an end of theſe two cords, and let them walk, the first who holds the end of the cord XY directly towards B, and the other who holds the end of the cord ST obliquely towards T : he who holds the cord XY, having reached Y at the end of his cord, ſhall place a picquet there ; to which let him tie the end of the cord of the perpendicular YT, and let him walk towards T, holding the end of this cord, till he meets or joins the man who holds the end of the cord ST ; and at the point T of their meeting let them place a picquet, to which let them tie the end T of the cord ST.