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**Animadversions of warre; or a militarie magazine of the truest rules, and
ablest instructions, for the managing of warre**

Ward, Robert

London, 1639

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Section VI.

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THE ART OF CONVEYING A MINE VNDER A FORT.

SECT. VI.

CHAP. LIIII.

How to conduct a Mine under ground to blow up a Bulworke.



His kinde of undermining hath beene very Anciently used both by the Greekes, and Romans, and of late daies by the Hollander, wherely they have much annoyed their Enemies, and blowne up their Out-Workes, yet many times it proves dangerous to the Pioniers, if they be not carefull to sustaine the earth over their heads with props and boords of two inches thicke; if the ground bee moist and full of Springs, a gutter with a discent must bee made that the Water may runne to some lower evacuation; if that cannot bee, a Well at the mouth of the

Mine must bee made for a receptacle for all the Springs to runne into; and Pumpes and forcers are to bee set sufficient to mount the Water.

There are foure principall causes to impeach the working of a Mine; first, the ill stopping of the Forne; secondly the weaknesse of the sides by Countermines or Caverns; thirdly by fayling of the Traine through moisture or ill contriving; fourthly, the most important is, that the Frame whereon the Barrells stand bee not placed too low, as under the leuell of the entrance, which it must ever exceed, because the qualitie of fire is ever to ascend.

Now for the conducting of this Mine, there are divers circumstances to bee considered; First, the distance from the place you intend to sincke your Mine, to the Wall or Bulworke you intend to blow up; Secondly, whether the ground be rising or declining towards the object; Thirdly, whether there bee any Rockes or Ponds which may hinder the direct carrying your Trench to the place assigned: These circumstances being considered, there are divers Instruments to bee used in the orderly conveying of them;

As first, the quadrant or Jacobs-Staffe to take the distance; Secondly, the Mariners Compass, (if a fitter instrument cannot bee had) by this you must observe in what point of the Compass the place you intend to Mine unto stands, from the place you intend to breake ground first; then you must have a leuell by which you may see how the ground riseth or declines, and accordingly bee guided, so that you worke not your selfe too farre out of the ground, nor too deepe in.

The Rules with the demonstrative Figures for the taking of heights and distances, you shall finde in the latter end of the discourse of the use of Artillery: Here I

Note, the Trench is to bee made 7 foot in height, and 5 foot in breadth.

4. things that hinders the effectual working of a Mine.



must there a pipe of Lead, or Reede runne from the Powder alongst the Myne, to the place where fire is to be given, filled with Powder, and raised from the ground, lest the wet should take it, then must the Myne be rammed up close, that no vent may proceed; the arching about will much strengthen it, and stay the reverse of the powder. The manner how to discover a Myne, is in the discourse of Fortification.

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Fortification each
should be able to
his work on