one inch of each portion of the string is set free; therefore, P ascends through two inches, and the principle asserts that

$$P \times 2 = W \times 1$$

which is the condition in § 65.

82. In the first system of pullies, let the lower block be raised one inch: then W is raised one inch, and one inch of each portion of the string at the block is set free; therefore, on the whole, $2n$ inches are set free, and this is the space through which P descends. First system. Fig. 7.

The principle then asserts that

$$P \times 2n = W \times 1,$$

the condition found in § 66.

83. In the second system of pullies, let W be raised 1 inch: then A_n rises through 1 inch, and each pully rises through twice as much as the one below it, and P rises through twice as much as the top-pully; therefore on the whole, P's ascent will be 2^n inches; and the principle asserts that Second system. Fig. 8.

$$P \times 2^n = W \times 1,$$

the condition found in § 67.

84. In the third system of pullies let W and the bar be raised 1 inch: then each pully descends through this 1 inch and twice as much as the pully above it, and P descends through 1 inch and twice as much as A_1. Third system. Fig. 9.

The last pully A_n descends through 1: therefore, the last but one descends through $1 + 2 \times 1$

" two	"	"	$1 + 2\,(1 + 2)$ or $1 + 2 + 2^2$
" three	"	"	$1+2\,(1+2+2^2)$ or $1+2+2^2+2^3$

and so on.