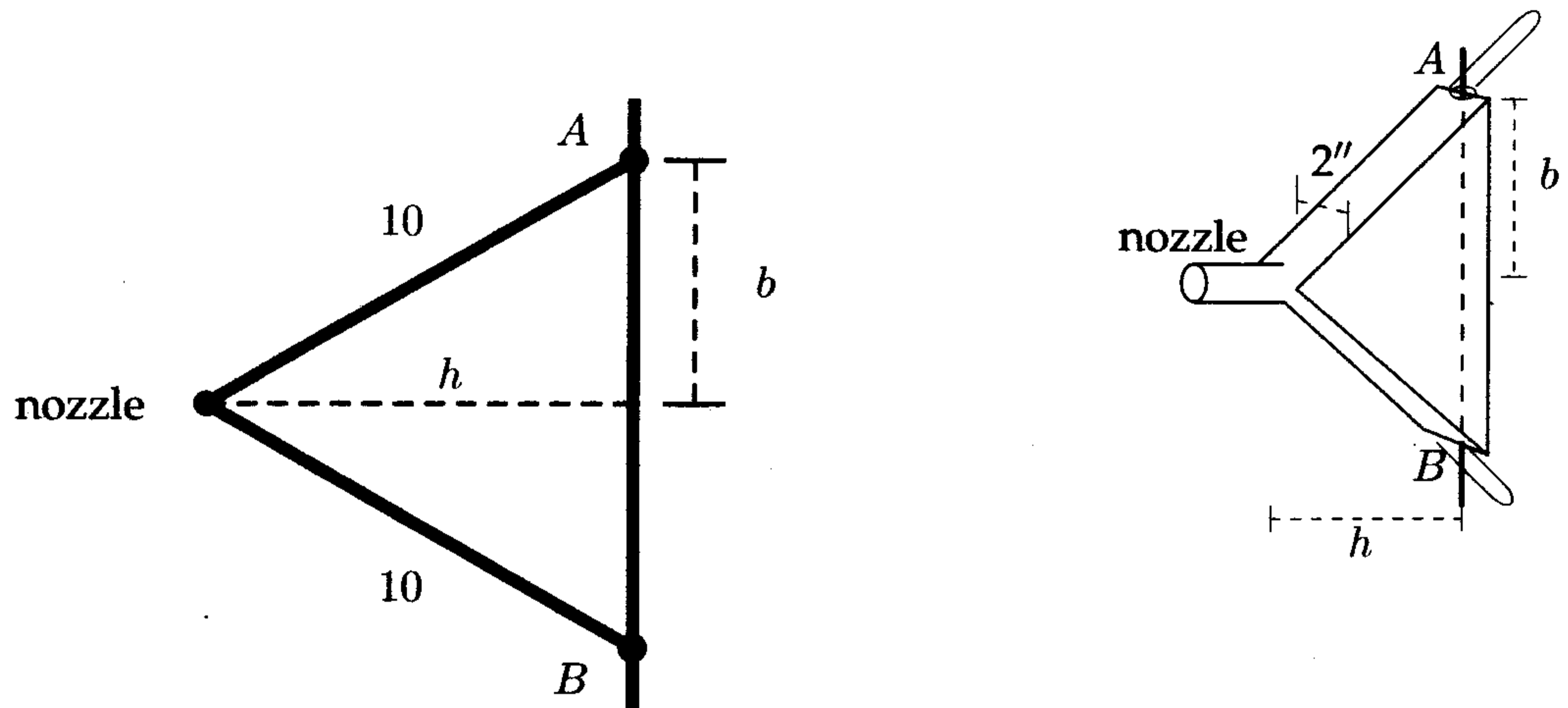


6. (10 points) A bellows<sup>1</sup> has a triangular frame made of three rigid pieces. Two pieces, each 10 inches long, are hinged at the nozzle. They are attached to the third piece at points  $A$  and  $B$  which can slide, as shown in the diagrams below (the figure to the right shows a 3D sketch of the bellows; the figure to the left, a 2D sketch that may be specifically useful for solving the problem).



Each piece of the frame is 2 inches wide, so the volume (in cubic inches) of air inside the bellows is equal to the area (in square inches) of the triangular cross-section shown above times the height of 2. Suppose you pump the bellows by moving  $A$  downward towards the center at a constant speed of 3 in/s. (So  $B$  also moves upwards at the same speed.) What is the rate at which air is being pumped out when  $A$  and  $B$  are 12 inches apart? (So  $A$  is 6 inches from the center of the vertical piece of the frame.)

<sup>1</sup>A bellows is a device with a nozzle attached to a chamber; it is used to blow air out through the nozzle by reducing the volume of the chamber. In the bellows described here this is accomplished by moving the points  $A$  and  $B$  as indicated.