

slip ratio the greater would be the contraction, and consequently the greater should be the variation of pitch on each side of the mean. Since the slip ratio at a given efficiency increases with pitch ratio, the variation should also bear some proportion to the pitch ratio. As the use of wide blades is frequently associated with high slip ratio, as for example, when diameter is restricted by the draught of water, not only do they occupy a considerable length of the contracting column Fig. 8, but also the amount of the contraction is greater; and if this reasoning is correct, there is a twofold advantage to be gained by giving an increasing pitch to screws with wide blades.

#### Propeller Balance.

(p. 51) In order to prevent vibration from being set up by the propeller in long fine vessels of high power, two things should be considered. The propeller should have a good running balance, and the center of pressure should be in the center of the disc. To ensure that the first condition is realized, each blade must be of the same weight, and the center of gravity of each must be at the same distance from the axis of the shaft. To satisfy the second condition is more difficult. If the screw works in undisturbed water and the surface of each blade is disposed symmetrically about the shaft, then the center of pressure will be in the center of the disc if the screw is caused to advance in the direction of the line of its shaft.

Any inclination of the shaft from the line of advance tends to throw the center of pressure out of the center of