

## COX'S COMPRESSED-AIR PUMP COMPUTER.

Common direct acting steam pumps may be operated by means of compressed air as well as by steam, but to ensure successful results, three points require careful consideration. These are:

- 1st. The size of the water cylinder should be adapted to the required volume of discharge.
- 2nd. The size of the air cylinder, as well as the working pressure of the air necessary to lift the required volume of water to the height desired, must be carefully proportioned.
- 3rd. The volume of free air, which under the necessary pressure and with the sizes of water and air cylinders selected, will satisfactorily do the work required, must be ascertained.

The Compressed-Air Pump Computer solves in the simplest manner possible each one of these problems, taking into consideration the various internal losses and making due allowance for them.

The Computer consists of three parts:- a foundation plate, a revolving disk, and a revolving segment, each one provided with scales representing the various factors of the formulas whose solution is sought. The method of using it is as follows:-

- A. To find the size of the water cylinder suitable to discharge a given volume of water.
  - (1) Set 20 lbs. pressure on the segment opposite 5 inches diameter of air cylinder, on the bottom scale of the Computer.
  - (2). Without moving the segment, set the arrow on the disk marked DISCHARGE opposite the number of gallons required to be lifted per minute, taken on the top scale of the Computer.
  - (3) Opposite the piston speed in feet per minute on the segment, find on the disk the diameter of the water cylinder.

(2). Cox's Computer.

NOTE. The gallons referred to are U. S. gallons of 231 cubic inches. To convert U. S. gallons to Imperial gallons, multiply by 0.833, and to convert Imperial gallons to U. S. gallons, multiply by 1.2.

B. To find the size of the air cylinder and the necessary working pressure of the air.

- (1) Set 20 lbs. pressure on the segment opposite 10 inches diameter of air cylinder, on the bottom scale of the Computer.
- (2) Set the diameter of the water cylinder (found as above) opposite the height in feet to which the water is to be raised, taken on the scale of "Lift" on the segment.
- (3) All coinciding lines on the two top scales of the Computer now give combinations of gauge pressures and diameters of air cylinder, from which selection can be at once made of the most suitable.

NOTE. The resulting diameter of air cylinder provides for pump friction only. Pipe friction, if more than nominal, must be provided for by suitable enlargement of the air cylinder.

C. To find the volume of free air which under the conditions obtained as above will do the work required.

- (1) Set the gauge pressure on the segment opposite the diameter of the air cylinder on the bottom scale of the Computer.
- (2) Bring the arrow on the disk marked PISTON SPEED opposite the piston speed in feet on the segment.
- (3) Opposite the arrow on the disk marked FREE AIR find on the top scale of the Computer the required volume of free air, in cubic feet per minute.

These directions in simple diagrammatic form, will be found attached to the Computer.