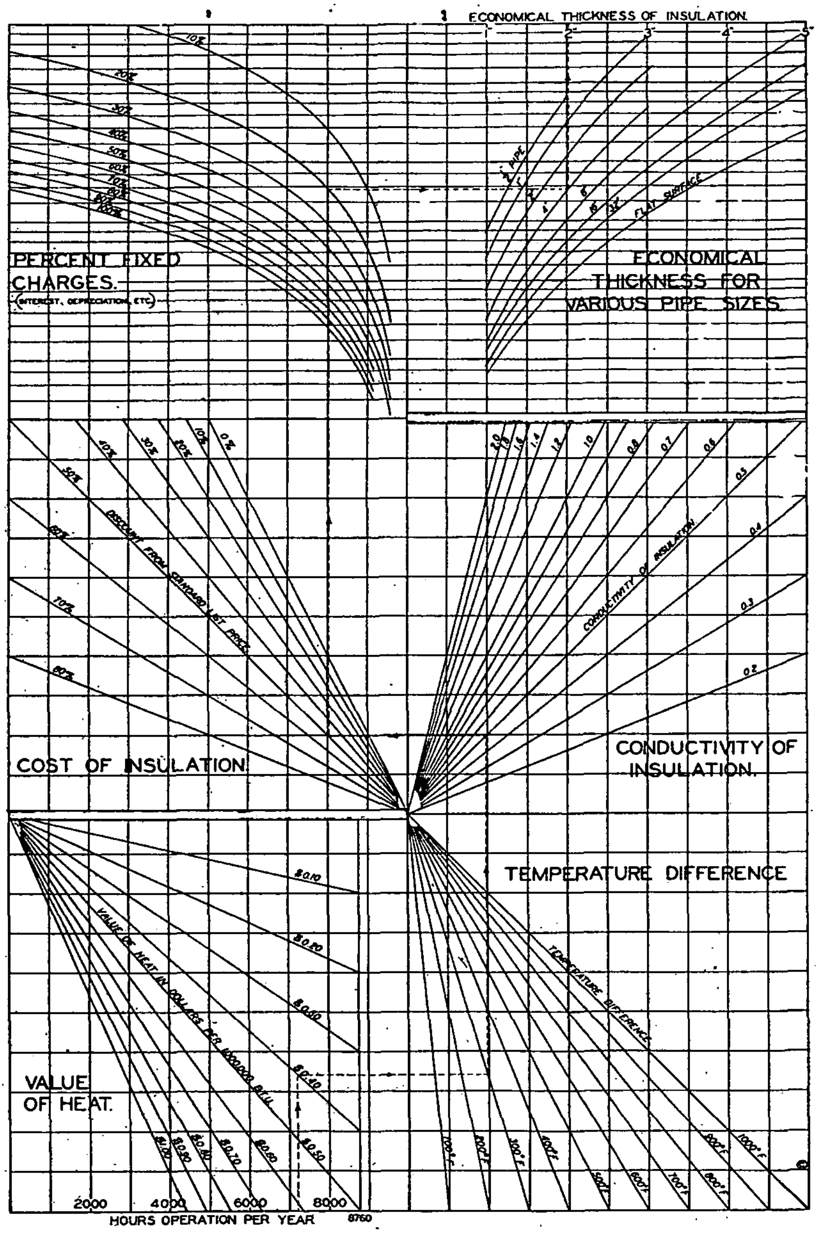

FIG. 4. CHART FOR DETERMINING ECONOMICAL THICKNESS OF INSULATION

TABLE 4. THICKNESSES OF INSULATION ORDINARILY USED

STEAM PRESSURES (LB. GAGE)	STEAM TEMPERATURES (DEG. FAHR.)	THICKNESS OF INSULATION		
		Pipe larger than 4 in.	Pipes 2 in. to 4 in.	Pipes ½ in to 1½ in.
0 to 25	212 to 267	1 in.	1 in.	1 in.
25 to 100	267 to 338	1½ in.	1 in.	1 in.
100 to 200	338 to 388	2 in.	1½ in.	1 in.
Higher Pressure or Superheat	388 to 500	2½ in.	2 in.	1½ in.
Higher Pressure or Superheat	500 to 600	3 in.	2½ in.	2 in.

ECONOMICAL THICKNESS OF INSULATION

Table 4 (TRANS., A. S. H. & V. E., Vol. 26, page 377) shows the thicknesses of insulation which are ordinarily used for various temperature conditions. Where a thorough analysis of economic thickness is desired, this may be accomplished through the use of the chart, Fig. 4.

In order to use the chart, start at the lower left hand corner and proceed to the right to a point representing the given number of hours of operation per year; then proceed vertically to the line representing the given value of heat; thence horizontally, to the right, to the line representing the given temperature difference; thence vertically to the line representing the conductivity of the given material; thence horizontally, to the left, to the line representing the given discount on that material; thence vertically to the curve representing the required per cent return on the investment; thence horizontally, to the left, to the curve representing the given pipe size; thence vertically to the scale at the top of the sheet where the economical thickness may be read off directly. The dotted line on the chart illustrates its use in solving a typical example.

EFFECT OF AIR VELOCITY ON SURFACE LOSSES

The rate of heat loss from a surface maintained at constant temperature is greatly increased by air circulation over the surface. Fig. 5 (*Iron & Steel Engineer*, July, 1925), is based on Langmuir's equations (*Trans. Am. Electro Chem. Soc.*, Vol. 23). Other investigators have shown even greater increases in rates of heat loss from bare surfaces due to air velocity.

In the case of well-insulated surfaces the increases in losses due to air velocity are very small as compared with increases shown above for bare surfaces, because of the fact that air flowing over the surface of the insulation can increase only the rate of heat transfer from surface to air, and cannot change the internal resistance to heat flow inherent in the insulation itself. The maximum increase in heat loss due to air velocity ranges from about 30 per cent in the case of 1 in. thick insulation, to about 10 per cent in the case of 3 in. thick insulation, provided that the insulation is thoroughly sealed so that air can flow only over the surface. If the conditions are such that the air may circulate through cracks and crevasses in the insulation, the increases may be far greater than those given above. Therefore, it is essential that insulation be sealed