pulleys, drive, etc.; or with both the width and length of conveyer, as for idlers, belt, etc., and a conservatively accurate equation can be derived for ascertaining the approximate cost of any belt conveyer of given size. Such an equation follows, Formula XV., which gives the total average cost of a conveyer equipped with a high-grade rubber belt and machinery of a high class. A similar conveyer, equipped with a good grade of stitched canvas conveyer belt, would cost but about half as much and systems may be purchased for any price between these two limits, depending upon the character and quality of the conveyer belt. The best grade of belt is really the most economical, however, as a conveyer so equipped will have a much longer life than one where false economy is attempted by the purchase of an inferior belt whose depreciation is bound to be rapid. In fact, it is only with the highest grade of all equipment that the full economic value of a belt conveyer system can be realized—this point cannot be too strongly emphasized. Table VII. gives equations for ascertaining the approximate cost of the various discharging devices which are customarily employed with belt conveyer systems, all of which vary approximately directly with the width of the conveyer (belt) rather than with the capacity of the system when handling any particular class and weight of material.

Initial Cost:

C = Cost of equipment in dollars.
w = Width of Conveyer (belt) in inches.
L = Length of Conveyer in feet—distance between end pulleys.

Cost of idlers per foot of Conveyer = 0.184 w — 0.899
" belt " " = 0.303 w — 1.261
" other machinery = 4.633 w

$$C = (0.487\ w - 2.16)L + 4.633\ w \qquad \text{Formula XV.}$$

Table VII.—Approximate Cost of Discharging Devices for Belt Conveyers.

Apparatus	Cost in dollars
Automatic Tripper - -	$15.7833\ w + 189 + 1.13L_t$
Hand-propelled Tripper -	$9.0\ w + 106.28 + 1.13\ L_t$
Fixed Dump - - - -	$2.8\ w + 16.4$

w = width of Conveyer (belt) in inches.
L_t = Length of Tripper Track—total travel of Tripper.

Although the carrying capacity of a belt conveyer varies with the square of the width of the conveyer belt, the necessity of loading devices, discharging apparatus, etc., that varies in cost with the size of conveyer, permits the expression of the average cost of a belt conveyer system in terms of the carrying capacity of the conveyer—i.e., average carrying capacity. Such classification is not as accurate for ascertaining the approximate cost of such a system as the formula based on the width of the belt, but for purposes of arriving at the average net cost of operation of a system, where only relatively small percentages of the initial cost enter into the question, an equation for approximating the cost of equipment, expressed in terms of the average tonnage per hour capacity, is sufficiently accurate for forming a conservative calculation of the average net operating cost of the ordinary belt conveyer installation. Particularly is this so for installations where the material handled is particularly heavy and where the initial cost ascertained by such an equation would be correspondingly low, the depreciation charge is apt to be very much greater than in an ordinary installation—the two inaccuracies, as to formula, thus tend to compensate for one another and the results obtained by the use of the formula for arriving at the measure of economic value of the system is approximately correct in any case. Depreciation on all component parts of a belt conveyer are not equal, of course, but a fairly reliable average value—one for the relatively expensive belt and the other for the balance of the machinery or equipment—does exist, provided for in the derivation of Formula XVI., which permits a close calculation of the true economic value of any belt conveyer system if the cost of power is known and the system is kept in good working condition and subject to efficient operation—i.e., is used frequently, for no conveying installation can be a really efficient one if allowed to remain idle much of the time.

Net Operating Cost (N.O.C.) of Belt Conveyers:—
L = Length of Conveyer in feet—maximum distance load is carried
H = Height (distance) through which load is elevated.
W = Weight of load conveyed in tons per hour (capacity).
N = Number of hours (total) Conveyer is in use per year.

Average Cost of Equipment:—
$= 0.0904\ WL + 1.07\ W.$

Fixed Charges:—
Interest .... 6% total cost
Insurance.... 1%
Taxes ..... 2%—¾ cost
$= 0.00768\ WL + 0.091\ W$

Depreciation, renewals, etc.:—

On belt	0.01990 WL
machinery	0.00317 WL + 0.107 W
Depreciation account..	0.00025 WL + 0.011 W
Total Depreciation, etc.	0.02332 WL + 0.118 W

Yearly Burden:
$= 0.031\ WL + 0.209\ W$

Horsepower, attendance, supplies, etc.:—
P_c = Price (cost) of a horsepower per hour.
Average consumption of power = $0.00021\ WL + 0.001\ WH$

	Horizontal Conveyer	Inclined Conveyer
Cost of Power	$0.00021\ WLNP_c$	$0.001\ WHNP_c$
Attendance, etc.	0.0000122 WLN	negligible
Supplies, etc. ..	0.0000128 WLN	negligible

Burden depending upon use of Conveyer:—
$= (0.00021\ WP_c + 0.000025\ W)LN + 0.001\ WHNP_c$

Then:

Net Operating Cost (N.O.C.) per ton:—

$$N.O.C. = \frac{31000\ L + 209000 + (210\ P_c + 25)LN + 1000\ HNP_c}{1{,}000{,}000\ N} \qquad \text{Formula XVI.}$$

Examples.

1. Conditions:—

Length of Conveyer	100′—0″	= L
Material Elevated..	20′—0″	= H
Service.....	2400 hours per year	= N
Cost of Power	$0.02 per horsepower per hour	= P_c

$$N.O.C. = \frac{3100000 + 209000 + 7008000 + 960000}{2{,}400{,}000{,}000} = \$0.00470 \text{ per ton conv'd}$$

2. Conditions:—
The same as in the preceding example except that service is but 1200 hours per year.

$$N.O.C. = \frac{3100000 + 209000 + 3504000 + 480000}{1{,}200{,}000{,}000} = \$0.00608 \text{ per ton conv'd}$$

The typical examples cited well indicate the real value of the belt conveyer as a means of transferring material from place to place, as the conditions assumed are very frequently found in practice. An interesting point is brought out by these examples, namely, that a belt conveyer is much more economical if in continual use than if used only occasionally. This is due to the facts that the system is very economical in the consumption of power, that the expense for attendance or labor is low when charged to actual tonnage handled, and that supplies, such as waste, lubricants, etc., are also low, while the burden of interest on investment, taxes, insurance, etc., is relatively high and is constant, no matter how frequently the conveyer is used. The burden of depreciation which is charged as the same in the two examples and so proportioned in Formula XVI., does not depend upon the hours of operation—provided, of course, that the conveyer