

tion and of the ordinary supporting structures required—items which should be rightfully charged against initial cost of equipment.

Cost of Equipment:

C = Cost of Screw Conveyor equipment in dollars.
d = diameter of Conveyor (screw) in inches.
L = Length of Conveyor in feet.

Average cost of screw per foot of Conveyor	0.1653 d
hangers, etc., per foot of Conveyor ..	0.0107 d
trough and gates per foot of Conveyor	0.0200 d
driving machinery per Conveyor.....	2.3233 d
ends, etc., per Conveyor	0.0700 d ²

Then:—
C = 0.196 dL + 2.3233 d + 0.07 d² Formula X.

This low cost of machinery is naturally a decided advantage and though the power requirements of screw conveyers are heavy as compared with some other types of conveyers, their compactness and general efficiency in handling comparatively small quantities of material, at a decided saving over the expense that would be entailed if manual labor had to be resorted to, make them very desirable in many installations, besides which their peculiar construction possesses certain advantages that are very desirable for special uses. To form a really reliable opinion as to their true economic value, however, the overhead charges must be taken into consideration. The burden of interest on investment, insurance, taxes, etc., is about constant for any specific size of conveyor, irrespective of the nature or character of the load handled, and, knowing the average cost of equipment, can be proportioned to the carrying capacity of the conveyor—whether the carrying capacity be expressed in bushels or in tons. Depreciation is dependent upon the severity of the service to which the conveyor is subjected, however, being greater in conveyers that handle cement, ore, coals and gritty materials than in the case of grain conveyers. Even in the case of the more trying conditions, depreciation would not be constant if exactly similar conveyers were used for handling the various materials, but this variation is controlled in great measure by the choice of the correct conveyor, i.e., material and strength of component parts. For instance, the screws of conveyers for handling cement, coal, small stone of ordinary hardness, many kinds of ore, etc., are usually of heavy steel construction while the screws of conveyers for handling ashes, more gritty ores, etc., are frequently of cast iron. The difference in material does not have much effect upon the initial cost of equipment—hence, practically none on the percentage or proportional part that represents depreciation—but does equalize the depreciation from abrasive wear. Grain conveyers are usually of lighter steel construction, but this does not materially reduce their cost, though their life is usually considerably in excess of that of conveyers subjected to the more severe conditions of wear. It is advisable, therefore, to differentiate between grain conveyers and those used in the more difficult operations of handling ores, cement, ashes, etc., in considering the net cost of operation. Attendance is about constant for any specific size of conveyor of given length, irrespective of the material handled, while renewals and repairs, like depreciation, are somewhat variable, depending upon the character of the load handled. Power consumption depends nearly entirely, in a well-designed and proportioned conveyor that is properly operated and cared for, upon the quantity of material handled. The expense for lubricants, waste and other incidental supplies also varies approximately with the consumption of power or quantity of material handled. The foregoing relationships being pretty accurately known, it is possible to derive equations for ascertaining

the average net cost of operation of screw conveyers upon which a reliable opinion of their economic value can be based. Such equations are given as Formulæ XI. and XII., the former applying to grain conveyers and giving the net operating cost per bushel handled and the latter applicable to screw conveyers handling ores, coal, ashes, cement, etc., etc., giving the average net operating cost per ton of material conveyed.

Net Operating Cost (N.O.C.) of Screw Conveyers:

L = Length of Conveyor in feet, max. distance load is carried.
H = Height (distance) through which load can be elevated in feet.
N = Number of hours (total) Conveyor is in use per year.
P_c = Price (cost) of a horsepower per hour in dollars.

GRAIN CONVEYERS.

B = Bushels conveyed per hour (capacity of Conveyor).

Average cost of equipment:—
= 0.01703 BL + 0.02458 B.

Fixed Charges:—

Interest.. 6% total cost }
Insurance 1% } = 0.0014426 BL + 0.0020893 B
Taxes .. 2%—¾ cost }

Depreciation renewals, etc.:—

On screw 0.001915 BL
trough, gates, etc. 0.000174 BL
hangers, etc. 0.000062 BL
balance of equipment + 0.000819 B
Depreciation account 0.000215 BL + 0.000082 B

Total Depreciation, etc. = 0.002366 BL + 0.000901 B

Yearly Burden:— = 0.00381 BL + 0.00299 B.

Horsepower, attendance, supplies, etc.:—

	Horizontal Conveyers (total)	Inclined Conveyers (extra)
Cost of power	0.000017 BLP _c N	0.000025 BHP _c N
Cost of attendance....	0.000002 BLN	negligible
Cost of supplies, etc. .	0.000010 BLN	negligible

Burden depending upon use of Conveyor:—

= (0.000017 BLP_c + 0.000025 BHP_c + 0.000012 BL)N.

Then:—

NET OPERATING COST (GRAIN CONVEYERS)
PER BUSHEL.

381 L + 299 + (1.7 LP_c + 2.5 HP_c + 1.2 L)N.

N.O.C. = $\frac{381 L + 299 + (1.7 LP_c + 2.5 HP_c + 1.2 L)N}{100,000 N}$ Formula XI.

CEMENT, ORE, ETC., CONVEYERS.

W = Weight of load conveyed in tons per hour (capacity).

Average cost of equipment:—
= 0.0005255 WL + 0.0006161 W

Fixed Charges:—

Interest.. 6% total cost }
Insurance 1% } = 0.00003617 WL + 0.00006237 W
Taxes .. 2%—¾ cost }

Depreciations, renewals, etc.:—

On screw 0.0001436 WL
trough, gates, etc. 0.0000131 WL
hangers, etc. 0.0000047 WL
balance of equipment. 0.0000616 W
Depreciation account 0.0000161 WL + 0.0000062 W

Total depreciation, etc. = 0.0001775 WL + 0.0000678 W

Horsepower, attendance, supplies, etc.:—

	Horizontal Conveyers (total)	Inclined Conveyers (extra)
Cost of power	0.00068 WLP _c N	0.00101 WHP _c N
Cost of attendance....	0.00010 WLN	negligible
Cost of supplies, etc. .	0.00040 WLN	negligible

Yearly Burden:— = 0.00021367 WL + 0.00012017 W

Burden depending upon use of Conveyor:—

= (0.00068 WLP_c + 0.00101 WHP_c + 0.0005 WL)N

Then:—NET OPERATING COST (N.O.C.) PER TON.

21.367 L + 12.017 + (68 LP_c + 101 HP_c + 50 L)N
N.O.C. = $\frac{21.367 L + 12.017 + (68 LP_c + 101 HP_c + 50 L)N}{100,000 N}$ Formula XII.

Examples.

I. Conditions:—

Length of Conveyor..	30' 0"	= L
Material elevated	8' 0"	= H
Service.....	2400 hours per year	= N
Cost of power....	\$0.02 per horsepower per hour	= P _c
Material handled—Grain		