so inclined as to form any desired form of trough. Any of these various types of troughing idlers will give satisfactory results if properly proportioned and, which is even of greater importance, if properly cared for. Particularly, must care be taken not to allow the lubricant to come in contact with the belt, oil or grease having a harmful action on rubber—the material that enters the construction of most belts.

The angle with the horizontal made by the inclined pulleys of the troughing idler varies considerably, being but 10 to 20 degrees in some cases and in others as much as 35 or 40 degrees. Deep troughed conveyers, those in which idlers with steeply inclined end pulleys are employed, have slightly greater carrying capacity than conveyers with more shallow trough, it is true, but such gain is counteracted somewhat by increased power requirements and by increased wear on the belt by the material handled. One of the most successful manufacturers of belt conveyers builds all troughing idlers with end pulleys inclined at about 25 degrees (slightly less in most cases). This angularity would seem to be about the most satisfactory, for with such it is possible to attain within 10 or 15 per cent. of the theoretical capacity of the conveyer, while even with the deepest practical trough the theoretical capacity cannot actually be reached and both depreciation, through abrasive wear of material slipping on the belt, and power requirements are unduly enhanced. A deeper trough may be advisable at loading points, however, as such construction would have the tendency to facilitate the proper arrangement of load on the belt for subsequent conveying. Theoretically, the capacity of a belt conveyer is limited by the amount of material that can be piled on a flat belt of the same width and is, therefore, dependent upon the angle of repose of the material handled. This arbitrary limitation is due to the fact that at some section of every belt conveyer the belt must be flattened. This may be either over the flat pulleys constituting discharging devices, or over the flat bend pulleys where the direction of the conveyer makes a sudden change, or, for conveyers in which there is no interruption to the trough from loading point to point of discharge, over the head pulley of the conveyer. A well proportioned belt conveyer carrying suitable material—i.e., material that is not too bulky for the size of conveyer, that possesses no disadvantages of undue heat or other quality productive of disastrous chemical action on the belt, etc.—has a pretty rigidly fixed carrying capacity at a given speed, however, and Table V. contains such data for conveyers handling material weighing 100 pounds per cubic foot at a conveyer (belt) speed of 100 feet per minute. Conveyers carrying material of other weight have capacities proportionally greater or less according to the weight of the material and, of course, the capacity of any belt conveyer varies directly with the speed at which it is run. Similar data, expressed in the form of a convenient equation, is given as Formula XIII.

Capacity:—

$$W = \frac{1.43\ w^2 V W'}{100{,}000} \qquad \text{Formula XIII.}$$

Where W = Weight of load (capacity) conveyed in tons per hour.
w = Width of conveyer (belt) in inches.
V = Velocity (speed) of conveyer in feet per minute.
W' = Weight of material handled in pounds per cubic foot.

Table V.—Capacity of Belt Conveyers, Continuously and Uniformly Loaded.

Material weighing 100 pounds per cubic foot.
Conveyer speed, 100 feet per minute.

Width of belt.	Tons per hour.	Width of belt.	Tons per hour.
12″	20.0	26″	96.0
14″	27.0	28″	108.6
16″	35.7	30″	126.8
18″	45.0	32″	143.5
20″	55.6	34″	160.0
22″	67.7	36″	183.0
24″	80.0		

All materials suitable for handling by belt conveyers are not necessarily possible of conveyance at the same speed, however, and this question of advisable speed is one over which there has been considerable controversy

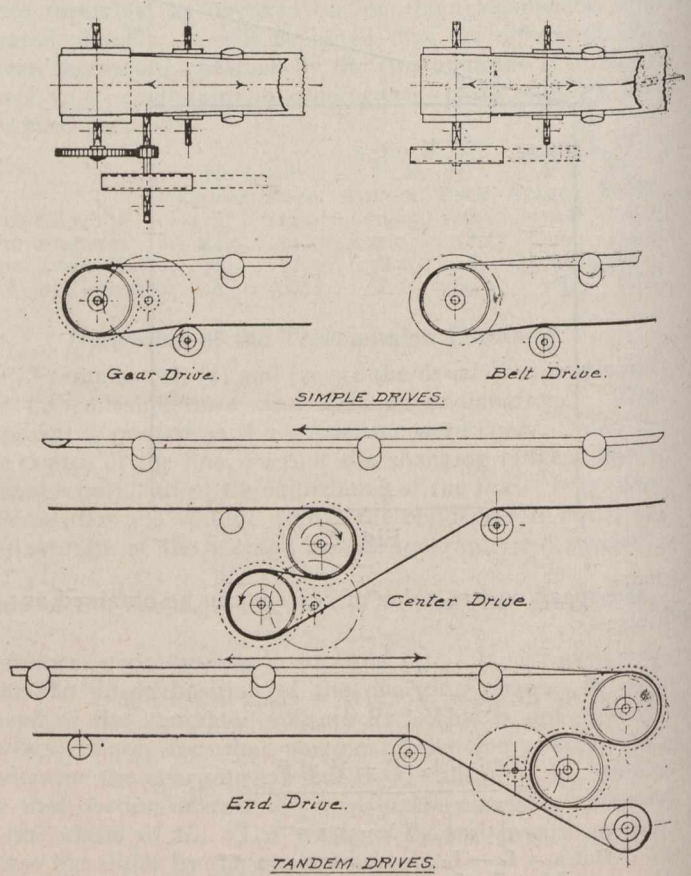

Fig. 1.—Diagrams of Typical Belt Conveyer Drives.

and no fixed rule can be advanced to cover all cases. Ordinarily, heavy materials can be carried at a higher speed than lighter ones, but practice has brought out many exceptions to such a rule. Table VI., compiled from records of a number of successful and efficient installations of belt conveyers, gives suitable speeds for handling a variety of the commoner materials usually conveyed by this class of apparatus, together with the average weight of such materials. The speeds given in the table allow for considerable lee-way, for a variation of as much as 20 to 30 per cent. is allowable and frequently advisable.

Before taking up a consideration of the power requirements and economic value of the belt conveyer, it is advisable to study in some detail the construction of the apparatus, general design of systems, etc. The troughing idlers that have already been considered are usually