Mechanics.

IMPROVED FREIGHT AND PASSENGER ELEVATOR.

The convenience and economy of elevators and hoists for passenger and freight service, in the saving of time and labor, have come to be so generally known and acknowledged, that at the present time no large business building or hotel is considered complete or desirable without one or more of them ; while in mercantile and manufacturing establishments they have long come to be looked upon as indispensable for the rapid and convenient handling of goods and freight. The requirements of first-class machines of this class demand that they shall be simple in construction, durable in service, not liable to derangement, that they shall possess an excess of strength beyond any reasonable demand they will be called on to meet, and, above all, that they shall realize the conditions of absolute safety as nearly as possible. These requirements are by no means simple and easy of realization. The makers of elevators had much to learn that could only be taught by experience, and during the twenty years or so that have passed since the introduction of the passenger elevator, the class of machinery has been vastly improved upon, by the expenditure of much care and ingenuity, until at present it has been brought to a very creditable state of perfection.

We illustrate in the accompanying engravings, and describe in what follows, several forms of the elevators manufactured by L. S. Graves & Son, of Rochester, N. Y.. who have gained considerable repute as representative manufacturers of this class of machinery. The firm in question manufacture all varieties of hoisting machinery, including power, hydraulic and hand elevators. Our illustrations represent two varieties of the power machines, the screw and geared machine for passenger service. The manufacturers, in the variety of the machinery they build, have endeavored to meet the various requirements of elevator service. The kind of elevator to be adopted will depend upon the location, the character of the building, the nature of the business, and the power most convenient to drive it. What would be best for one set of circumstances, therefore, will not be suitable for another. The manufacturers of these machines, therefore, recommend their steel screw machine (of four sizes) where parties have steam or power in their building, and want a first-class, noiseless-running elevator, wholly or in part for passenger use. Where a machine is desired for heavy freight uses, as in a manufactory or machine-shop using power, and where the running of toothed gearing is not objectionable, the makers recommend their geared machines (of three sizes), as answering the purpose best. If in a hotel, commercial building, drygoods, clothing or similar establishment, where power is not wanted or used for other purposes, and where the city or town is supplied with a system of water works at a pressure of from 25 100 pounds, and charges are not extravagant, they recommend their hydraulic elevator. In such cases, the cost of the last named would be much less when compared with that of putting in and maintaining steam power. The heat, steam, smoke, danger from explosion, increased insurance, etc., would also be avoided.

Coming back, after these preliminaries, to the description of the special machines named in the foregoing, we invite attention to Figs. 1 and 2, which represent respectively the No. 2 screw machine erected and in operation, and the hoisting mechanism of the machine. The machine is shown in use as a freight elevator, but can readily be transformed into a passenger elevator by substituting a passenger car in place of the open platform. In either case, the hatchway should be completely enclosed from top to bottom, by a wire screem or glass-panel doors on each floor, to be opened only from the inside by the attendant on the car or platform. Side or corner platforms are used, according to the necessary location of the machine.

The position and location of the winding machine, also, can be varied to suit the location of the driving shaft in the building. Fig. 1 shows its general arrangement, when secured to the floor overhead, in its working position.

These machines are equally well adapted for freight and passenger service. They run smoothly and noiselessly, are not liable to become disordered, are very durable in service, and consume the minimum of power. The screw is made of cast steel, forged solidly upon the driving shaft, and cut and finished with special tools. It runs on three hard Babbitt, self-oiling bearings, placed above the worm-gear, which concentrates all the strain on the strongest parts of the frame, and carries the pulleys and belt high out of the way. The worm-gears are made of copper and tin proportioned for the hardest anti-friction metal, and are exposed where their condition can be seen and examined at all times. These machines are fitted with improved automatic stop motion, which is adjusted to the height of the building, and prevents the winding drum from making more than the number of revolutions required to take the platform from the bottom to the top, where it is automatically stopped, without any connection with the shipping ropes. The loose pulleys have long bearings lined with composition sleeves, and have large self-oiling chambers.

Screw machines Nos. 3 and 4 are constructed on the same principle as No. 2 above described, but are larger, and adapted for the heavier and more expensive class of freight and passenger service. With these elevators, the winding machine is built to rest upon the floor or foundation close to the hatchway, where it will be more accessible and likely to receive better care and attention. Fig. 3 represents the hoisting mechanism of the No. 3 screw machine. These machines are constructed of the same materials, and are provided with the same special appliances as the No. 2 machine above described.

Fig. 4 represents the mechanism of the geared elevator No. 3, made by the same firm. These machines, while not suited for passenger service by reason of the noise and jar attending the working of toothed gearing possess all the requirements of simplicity, strength and durability which are needed in a freight elevator, for which they are specially designed.

Geared machine No. 3 has a 24 inch winding drum, screw geared, to receive the wire rope. The gearing is heavy, and runs comparatively noiselessly. The journal boxes are long, Babbitt-lined, and have self-oiling reservoirs and oil drippers. The loose pulleys have long bearings and self-oiling chambers. A double cam and two shipping rods permit each belt to be moved separately, rendering them easier to operate and with less wear than with the usual way of shipping both belts when it is only desired to move one. A heavy steel spring, with screw adjustment, is used to put on the brake and hold the toad, and also serves the purpose of bringing and holding the belts to their proper places on the loose pulleys. These machines are provided with a safety governor, designed to avoid the danger of their running down suddenly with a load in case the belt should break or the brake become deranged. Its operation is such that should the platform from any cause go down faster than its usual rate of speed, a powerful brake is brought to bear on the pulley shaft, keeping it within a safe speed of descent. When it is down, the governor returns to its former position.

The hydraulic elevator has, by general consent, come to be recognized as the passenger elevator *par excellence*. The general advantages of this system over the use of steam power have been briefly referred to at the outset of this article, and have been fully detailed in previous articles that have appeared in this journal. They do not, therefore, require to be rehearsed in this connection.

Messrs. L. S. Graves & Son, in inviting attention to their special build of hydraulic elevators, lay stress on the fact that they prefer to build the horizontal hydraulic engine with the continuous wire rope and sheave system. In behalf of this preference, they claim that this form of engine best serves the requirements of the hydraulic elevator in respect to safety from accidents, economy of water, simplicity and freedom from derangements, and durability in service. Furthermore, the engine, valve and connecting pipes are set upon heavy timbers and masonry upon the basement floor—high, dry and clean. and easy of access for oiling or repairs. The working parts, the piston and its connections, are carried on wheels and run on iron rails, perfectly balanced in any position. If necessary to economize room, a shelf or bench is built directly over it for the storage of goods. Also by its position in the basement or sub-cellar (generally the least valuable room in the building), it receives the maximum pressure from any source of supply, whether it be a tank on the roof or from the street mains, as the pressure, or the working power, is due to the hight of the source of supply from the hydraulic engine, consequently the manufacturers guarantee the greatest possible lifting capacity from the amount of water used.

In some forms of the hydraulic engine, where they are confined to the basement, they require to be set several feet below the surface, which is very objectionable in many respects. In other forms more commonly used, the cylinder and working parts extend up the whole height of the hatchway, necessitating about one-third larger hatchway for the same size car than it would if these parts were confined to the basement, occupying from 10 to 20 square feet on each floor of the most valuable room in the building; and as these working parts, weighing many hundred pounds, are suspended high above the head, besides being very unsightly, are suggestive at least of serious accidents.