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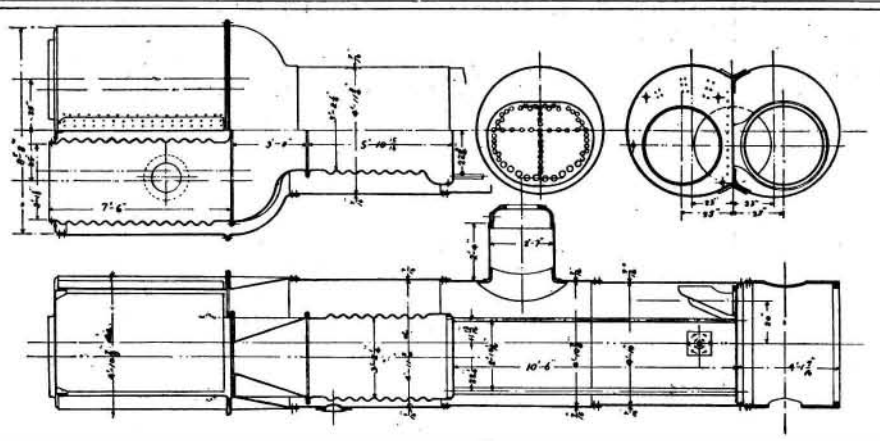
THE STRONG LOCOMOTIVE.

The locomotive of the present day is but little different from the machine of thirty years ago. The old fashioned slide valve of the D type has been retained, the boiler has for many years been of the tubular character, of so definite construction that the term locomotive boiler represents a well recognized structure. For a long time locomotive boilers were noted for carrying high pressures, but now they are distanced in the race, even the large marine boilers on steamships equaling or exceeding them in this respect.

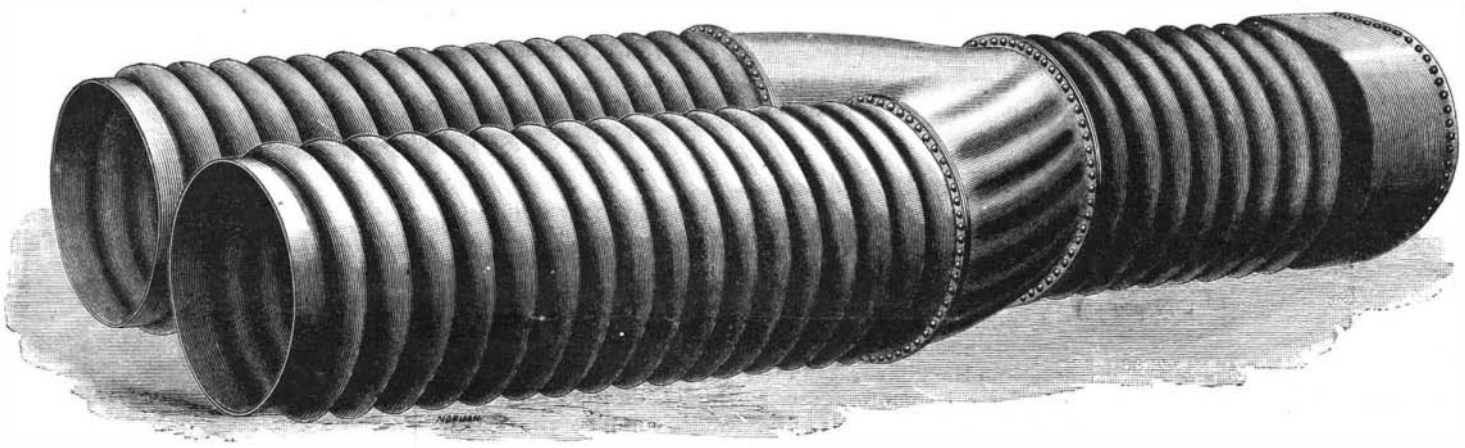
The Strong engine indicates a departure in the construction of locomotives that is quite radical. The boiler and valve gear are of original design, and the results already achieved appear to be well in advance of the usual practice. The engine we illustrate can maintain a speed, it is claimed, of 60 miles an hour, and is credited with a mile in 47 seconds. These results were obtained while it was new, and not fairly limbered up.



FIRE BOXES AND COMBUSTION CHAMBERS.

The boiler is bifurcated at the fire box end, forming two fire chambers, and contains two grates. The fire boxes are joined to a single combustion chamber which forms the next division of the boiler. These parts are made of corrugated steel plates with welded longitudinal seams. The combustion chamber abuts against the tube sheet. Forward of this comes the main body of the boiler, traversed by the tubes, 235 in number. The boiler shell incloses the two fire boxes and the combustion chamber, being itself bifurcated. As far as possible, all the elements of the shell are cylindrical. The connecting portions between the barrel and the bifurcated portion are of generally spherical outline, so that the ends are the only flat portions. A flexible shell exposed to internal pressure would naturally take the cylindrical and spherical contour. Thus the steam pressure does not tend to change the shape of the shell, but all the strains resolve themselves into tension, except of course for the flat heads. These are strengthened by gusset plates, but the tubes supply the principal element of bracing, otherwise the boiler is unstayed. A man can have access to every portion of the interior around the fire boxes. By using flanged seams, hand riveting can be dispensed with. Much of the shell can be shaped by hydraulic pressure.

The two fires co-operate in burning the fuel. On one grate a very hot thin fire is kept, while a new fire is burning on the other. The latter gives off imperfectly oxidized gases which enter the combustion chamber. There they meet the hot oxidizing flame from the other fire, and are completely consumed. The fires are made to alternate in these roles. Thus almost any kind of fuel can be burned by one engine. The absence of stays and crown bars gives the boiler a character of unity that adapts it to withstand the strains and jarring inevitably attendant upon its work. Where a boiler is to be subjected to torsional and transverse strains, as in locomotive practice, every stay is an element of weakness, only admissible to enable the flat surfaces to stand the internal steam pressure.



CORRUGATED BOILER.

The corrugated furnace chambers have, as our readers know, been extensively introduced in marine boilers. They have effected important economy in this

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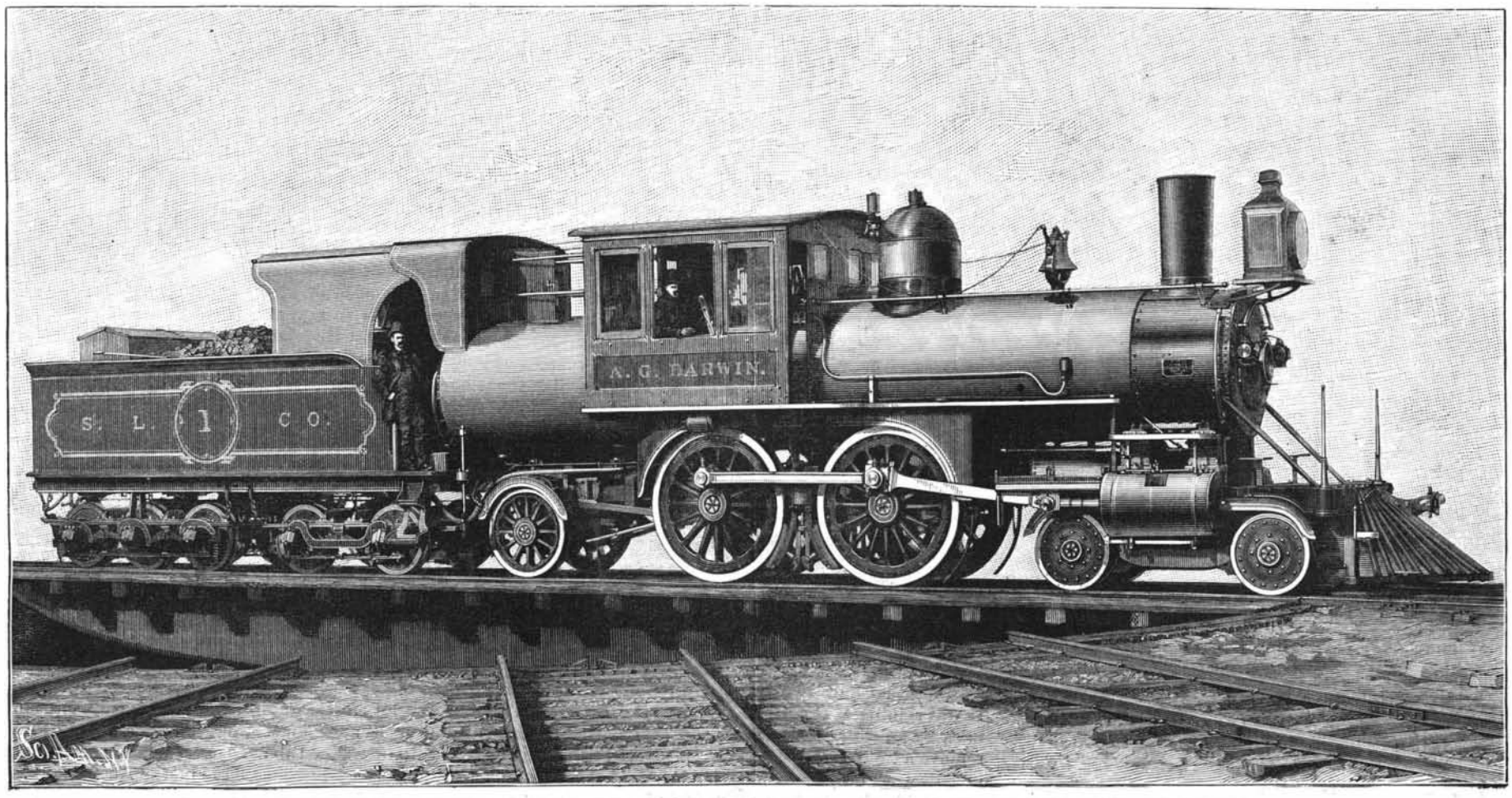


LOCOMOTIVE WITH DOUBLE CAB MANUFACTURED BY STRONG LOCOMOTIVE COMPANY.

THE STRONG LOCOMOTIVE.

(*Continued from first page.*)

service, as higher pressures can be carried than with the old style flat-sided structures. They have co-operated with the compound engine to bring down the coal consumption to the very low point it has now attained in good practice. Its introduction on a locomotive is a step in the right direction, comparable to compounding the cylinders.

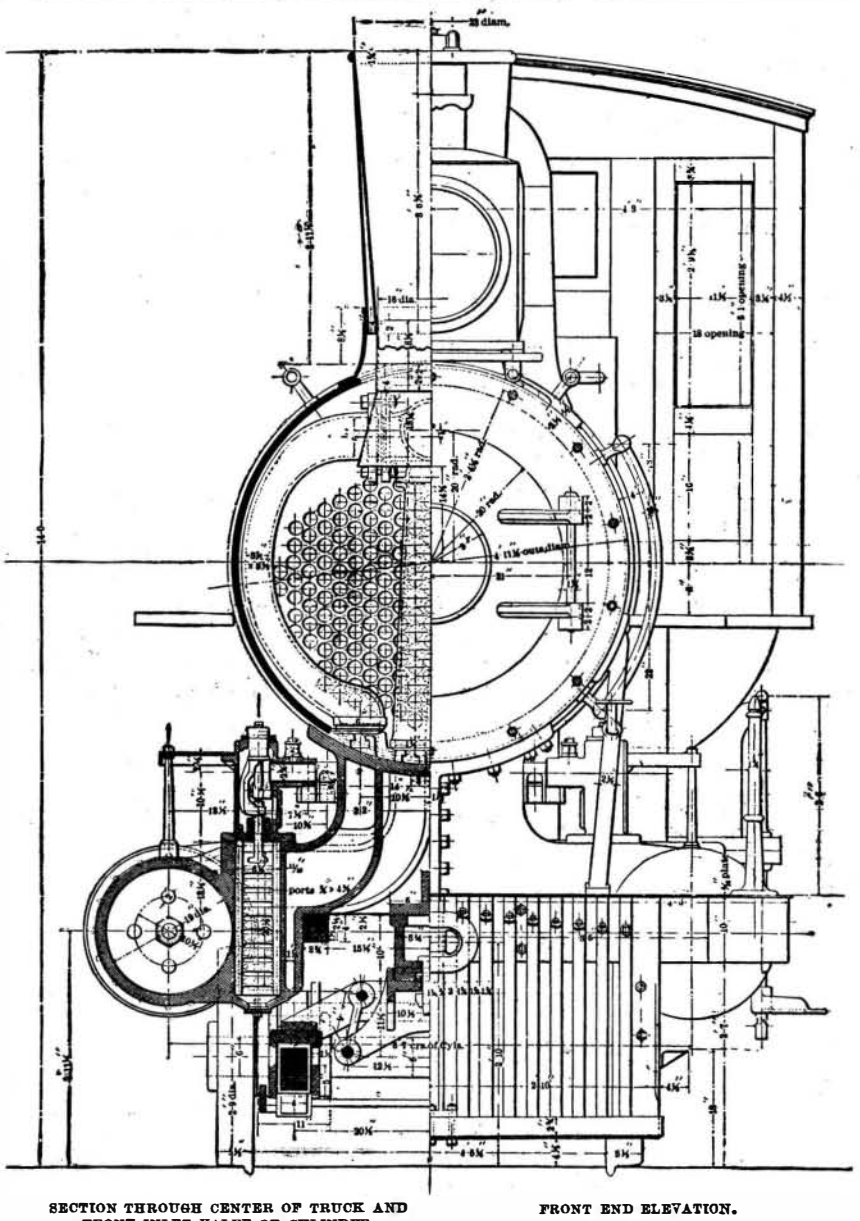
By its peculiar valve, the Strong engine is supposed to do away with the necessity for this last step. They are of such large port-area that a very sharply defined cut-off can be obtained. There is no steam chest, but each cylinder is fitted with four valves, two exhaust and two steam valves. They are of gridiron type. The steam valve has ten parallel openings, each 4⅝ inches long, giving a total port length of nearly four feet (46¼ inches). The four valves are worked by a single eccentric, so that the usual link motion is not used. It is impossible to fully describe the details here. The general action is slow at the beginning of the movement until the cushioning of the exhaust end of the cylinder relieves the pressure, when the valve quickly completes its travel. This avoids much of the friction of valve motion, something which has proved a very serious source of loss of power in ordinary engines.

When the engine is working at 250 revolutions per minute, it is claimed that the initial cylinder pressure will be within two pounds of the boiler pressure. When all is in perfect adjustment, it can readily be seen that excellent results should be obtained. The small extent of valve travel, about 1⅛ in., together with the large port-area, about 48 sq. in., is the cause of this perfection of action. Against it, however, the point has been made that the least amount of lost motion would seriously affect its work. Yet it seems clear that it would be well worth while to watch the valve gear closely, and keep it in condition to avoid such defects, when it is remembered how much good is involved in its details.

Its general dimensions are as follows:

Cylinders, 19 in. diam. by 24 in. stroke.	
Driving wheels, 68 in. diam.	
Total weight of engine with boiler full and coal on grates	138,000 lb.
Weight on both pairs of drivers	72,000 "
Weight on forward truck	34,000 "
Weight on trailing wheels	32,000 "
Grate surface	30 sq. ft.
Heating surface	1,650 "
Working pressure of steam	160 lb.
Wheel base of drivers	7 ft.
Total wheel base	29 "
Height above track, clearing everything	14 "
Total length of boiler	31 ft. ⅝ in.

It will be noticed that the engine has two cabs. A speaking tube is provided for communication between the fireman and engineer.

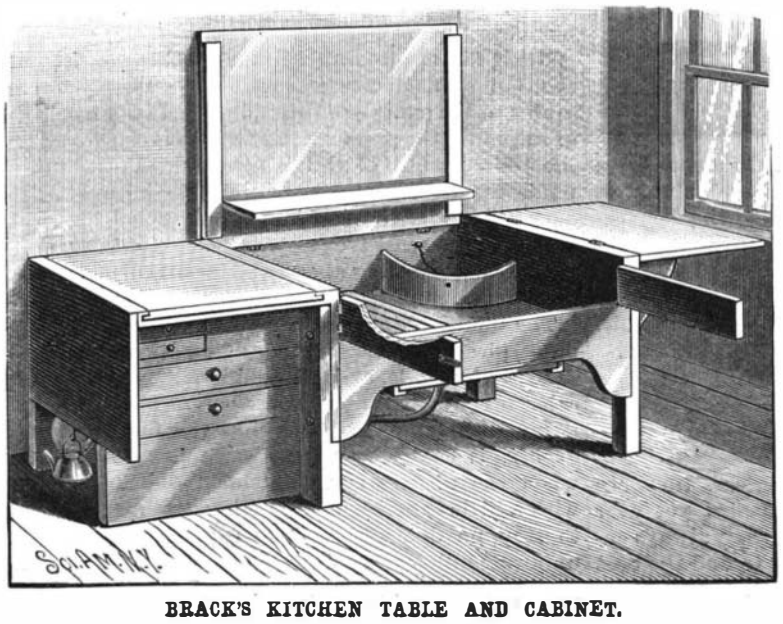


SECTION THROUGH CENTER OF TRUCK AND FRONT INLET VALVE OF CYLINDER. FRONT END ELEVATION.

TRANSVERSE SECTION OF ENGINE SHOWING STEAM VALVE.

IMPROVED KITCHEN TABLE AND CABINET.

The construction shown in the accompanying representation differs in many points from previous inventions in this department, the table and sink themselves constituting the greater essentials, and not being minor to details of less consequence. The body proper is composed of a table in two heights, the opened front showing the lower portion, at which a child may stand or a chair be placed when desired. Inside there is a compartment or basin, in which dishes may be washed, with a water outlet, and a space for the common pan for rinsing. The open doors also constitute a towel rack, and the whole, when closed, makes a convenient receptacle for unclean dishes. The main portion, constituting a table when its cover is down, may be elaborated by adding a leaf to one or both ends, and under one of these, itself a bread board when inverted, is a cabinet, as shown in the cut; otherwise, two large bins may be placed under one leaf, and drawers under the other, leaving spaces for hooks, where iron vessels may be kept out of sight. Shelves may also be attached to brackets upon the leaves. The whole is made in parts attached by screws, and the legs are adjustable. The essentials and adjuncts are thus, with this construction, brought readily within the reach of a person in one position, the whole being economically made, and suited to stand in the dining room as well as the kitchen of numerous households. For further particulars with reference to this invention, address the patentee, Mrs. Mary S. Brack, No. 912 North Oregon Street, El Paso, Texas.



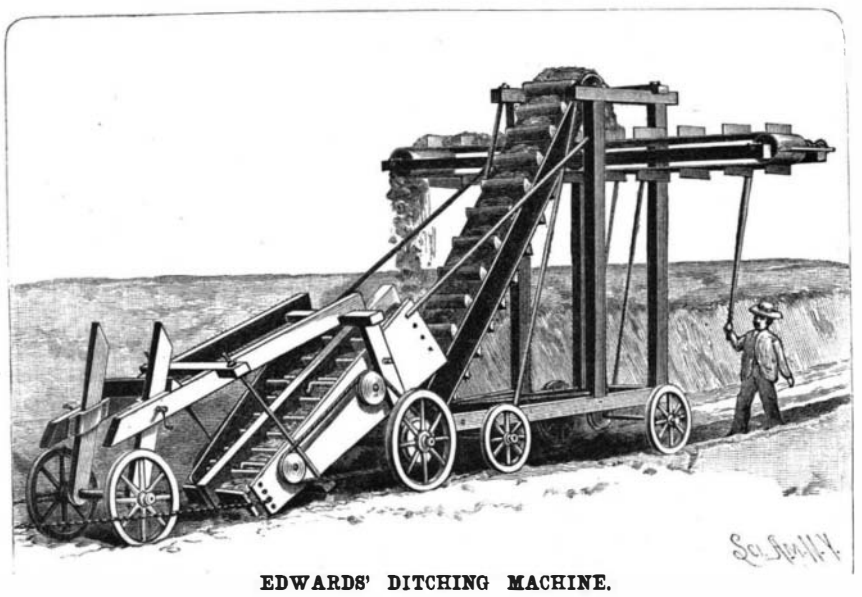
BRACK'S KITCHEN TABLE AND CABINET.

How Much Current to Kill an Elephant?

Many who saw or heard of the experiments made with alternating electrical light currents at the Edison laboratory, to find a substitute for hanging, will regret that the big elephant Chief, of Forepaugh's circus, sentenced to death for his viciousness, could not have been experimented with, as was promised. It is the skin which gives the strongest resistance to the passage of the current, and though animals are far more vulnerable than men, yet there was reason to believe that it would not have been an easy task. Just where the electrodes should have been placed would have been an interesting study. With one pole at the apex of the heart, and the other at the neck, where it would reach the phrenic nerve, dogs have been found to readily succumb. But would the 3,000 volts current, which, we are told, will surely kill a man—they have been killed with far less than this—be enough to dull the consciousness of an elephant and then kill? It seems the circus people could not wait for the elaborate preparations necessary. They tied a noose around Chief's neck, and giving an end each to two other elephants, started them tugging in opposite directions till the big elephant was dead.

AN IMPROVED DITCHING MACHINE.

The accompanying illustration represents a machine for digging ditches or trenches of any desired depth or width for irrigation, drainage, or pipe laying, or for making earth fences, etc. It has been patented by Mr. Charles C. Edwards, of Amorillo, Texas. The scoop is held between uprights of the digger frame, the draught being applied by hooking chains into holes in the forward parts of the sides of the scoop, and the body of the scoop resting upon a crossbar hung by bolts from the upper crossbar of the digger frame, screw nuts on these bolts providing for the regulation of the height of the nose of the scoop to a limited extent. Set screws in the side bars of the frame provide for locking the front wheel frame at the keepers at any required height relatively to the scoop, thus allowing the forward wheels to he set higher or lower, as the scoop is to cut deeper or shallower in the earth, according to the nature of the ground or the amount of power employed. Within the scoop is hung, by two crank shafts, an earth conveyer, which is reciprocated by the cranks of the shafts, so as to carry the earth dug by the nose of the scoop up its inclined bottom, discharging the earth from the upper rear end of the scoop on the front of an elevator carrier. The digger and carrier may be readily separated, to allow connection of another digger, which will cut a deeper ditch, and this separable connection promotes convenience in housing the apparatus when not in use.



EDWARDS' DITCHING MACHINE.

The elevator consists of an endless belt, with buckets, which runs over upper and lower rollers on the carrier frame, traveling behind the digger. The uprights of this carrier frame also support a pair of laterally ranging timbers forming supports for a laterally traveling endless earth-discharge belt. The elevator belt is operated automatically by gear wheels on the front axle of the carrier truck, as the carrier is drawn forward, and the laterally traveling discharge belt is similarly operated by means of bevel gear and a belt running on a pulley fast to the rear axle of the carrier frame. With this construction, as the machine is drawn forward, the earth cut by the scoop is carried by the conveyer hung therein and dropped into the buckets of the elevator, which carries it upward and discharges it upon the endless belt of the laterally traveling carrier, which may be operated in either direction to discharge the earth to either side of the ditch cut by the machine.

THE largest railway station in the world is the one inaugurated at Frankfort-on-the-Main, on the 18th of August. It covers a superficies of 335,916 square feet. Hitherto, the largest stations have been the Saint Pancras at London (166.625 square feet) and the Silesia station at Berlin (130,000 square feet). That of Frankfort is double the size of the first named.—*La Semaine des Constructeurs.*