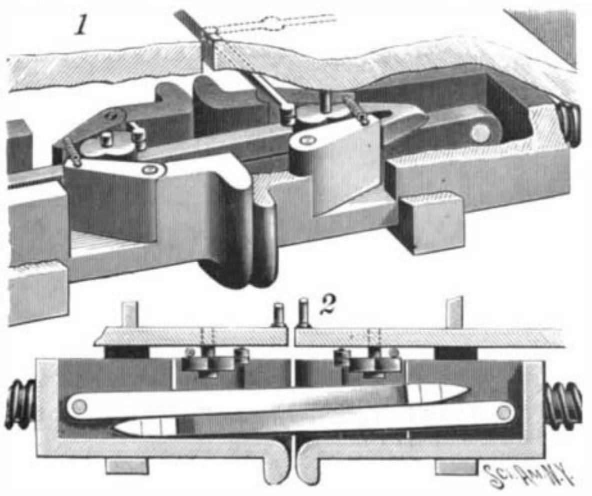
AN AUTOMATIC CAR COUPLER.

The automatic car coupler shown in the illustration has been patented by Mr. Peter Gallien, of New Haven, Connecticut, and Edward M. Clark of the same place. The drawhead is made open at the top, and in each of the side walls of the coupling chamber is placed a stout latch which is pivoted at its forward end, the free ends of the latches being drawn together by a coil spring. The drawhead coupling bar is horizontally pivoted at the rear end of the coupling chamber, and extends some distance beyond the front face of the drawhead, terminating in an arrow-shaped head. The head is perforated to receive a coupling pin when the improved drawhead is to be coupled with a link and pin coupler. The top and bottom faces of the coupling bar head are inclined so as to form a sharp horizontal edge. A cam is located between the opposing latches, and actuated by a link and rocking lever, which may be suitably operated from the platform of the car. In its normal position the longer axis of the cam is parallel with the



GALLIEN'S AUTOMATIC CAR COUPLER.

axis of the drawhead; but when it is desired to unlock the coupling, the cam is thrown over and forces apart the latches, thereby releasing the drawbar. In making a coupling, one coupling bar will ride upon the other as shown in the illustration, and the wedge-shaped heads will force apart the side latches, said latches being ultimately drawn snugly into place behind the recessed shoulders of the drawbar head by the tension of the spring, thus effecting an automatic and positive coupling.

A DOUBLE TANK COMPRESSED AIR MINE LOCOMOTIVE.

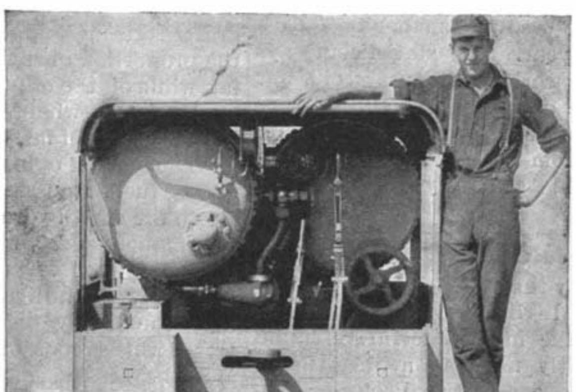
The compressed air locomotive has a special field of usefulness in locations where it is necessary to take extra precautions against risk of fire, such, for instance, as powder mills and lumber yards and the great cotton wharves and warehouses of the South, or those coal mines which are infested with dangerous gases. In this respect it is greatly superior to the steam, or even the electric, locomotive; and, as compared with rope haulage, it has the advantage that it has greater mobility, and can be run independently over a wide area of sidings, etc.

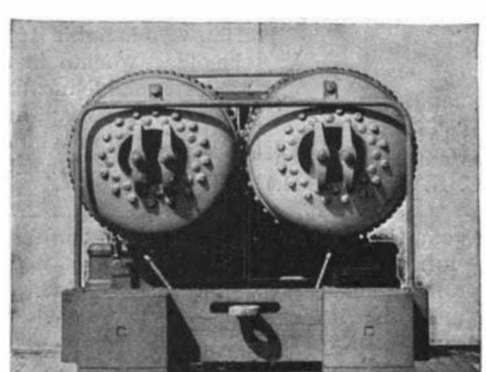
The accompanying illustrations show a double tank compressed air mine loco motive, built by H. K. Porter & Company, Pittsburg, Pa., for the Susquehanna Coal Company, Glen Lyon, Pa. The dimensions are as follows: Cylinders, 7 inches diameter by 14 inches stroke; driving wheels, four-coupled, 24 inches diameter; weight, in running order, 18,500 pounds; length over all, 17 feet 6 inches; width, 5 feet 2 inches; height, 5 feet. There are two tanks of 130 cubic feet combined capacity, and the charging pressure for doing full work is 600 pounds. The air for charging the locomotive is furnished by a three stage compressor, having 20 by 24 inch steam cylinders, with compression cylinders 12½ inches, 9½ inches and 5 inches diameter by 24 inches stroke, with a capacity of 275 cubic feet of free air per minute compressed to 600 pounds per square inch at 100 revolutions per minute. This capacity is more than sufficient for two locomotives. When supplying one locomotive the average speed of the compressor is about 40 revolutions per minute. The air is conveyed in a 5 inch wrought iron pipe to the bottom of the shaft, a distance of 1,000 feet, and a further 3,400 feet along the gangway. Along the gangway are three charging stations, provided with gate valves, which enable any section to be cut off. The 5 inch pipe, which has been tested to 1,500 pounds pressure, acts as a reservoir to the compressor, having a capacity of 580 cubic feet at 600 pounds pressure. The charging station consists of a cast tee on the main pipe, with a 1½ inch opening, provided with a gate valve and a flexible metallic joint. It takes one and one-half minutes to charge the locomotive, the pressure in the main being thereby reduced from 600 to 570 pounds.

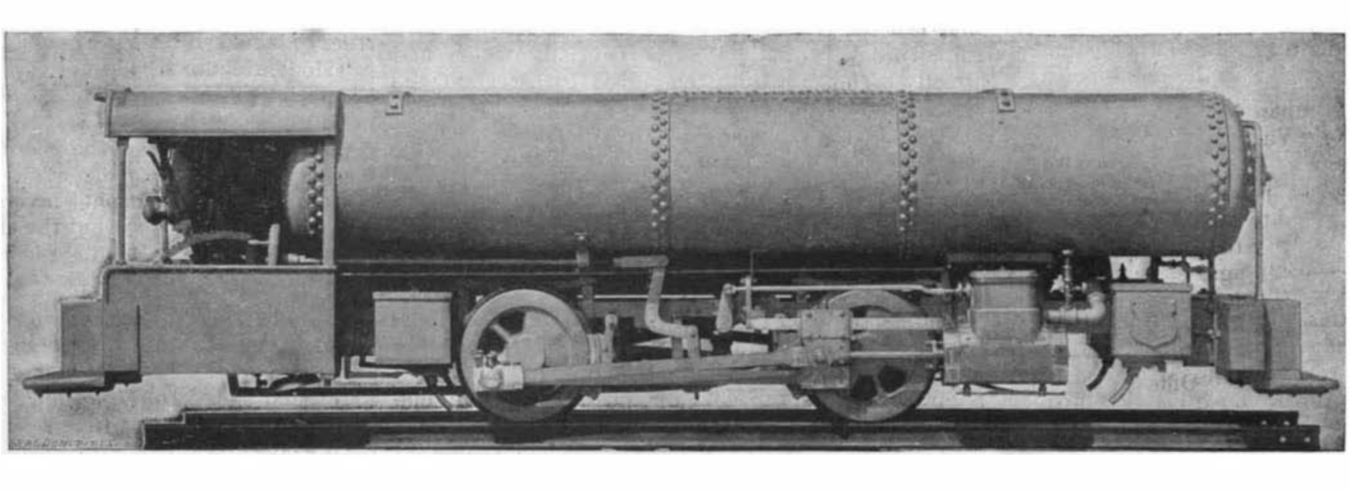
The air is stored in two steel tanks which are located between the locomotive cylinders on a saddle, much after the manner of a steam boiler. From them it is conducted to an auxiliary reservoir, eight inches in diameter, placed below and between them. In this tank the pressure can be regulated anywhere from 30 up to 140 or 150 pounds as required. The air is reduced from the main tanks by a reducing valve which can be regulated to any pressure at a moment's notice, and when once set, it maintains a constant fixed pressure in the auxiliary reservoir, thereby preventing any undue waste of air by injudicious handling. In case only light loads are to be handled, the pressure can be materially reduced in the auxiliary reservoir, or, on the other hand, in emergencies almost any pressure can be at a moment's notice utilized, and this without any undue heating or loss. In the auxiliary reservoir the air is controlled by a differential throttle, admitting the air to the cylinders.

The gage of the track is 36 inches, and the average grade is 1·07 per cent and the maximum grade 2·8 per cent in favor of the loaded cars. The locomotive hauls trips of 16 empty cars of about 2,500 pounds weight from the foot of the shaft, 3,700 feet, into the gangway, and trips of 16 loaded cars each with about 6,700 pounds of coal back to the shaft, with one charge of air, starting with a pressure of 575 pounds and ending with a little over 100 pounds. The heaviest work is hauling the empty trip up grade. The weight of each empty trip of 16 cars, including the locomotive, is about 60,000 pounds, and of the loaded trip, including the locomotive, 166,000 pounds. The locomotive will make from 25 to 50 miles per day, depending on the length of the run and the time required for making up trips.

The cost of operation of this plant has been found to vary from one to one and one-half cents per ton mile, including all expenses, interest and depreciation of plant, varying with the character of the rolling stock used. The depreciation on the locomotive is very low, there being no boiler to wear out; and the tanks, having nothing to corrode them, should, if kept well painted, last almost an indefinite period. In this case the condition of the car wheels, owing to spragging, was bad, there being many flat spots caused by sliding, and the frictional resistance per ton on the track was excessive. These cars are gradually being equipped with self-oiling wheels and a better form of brake. When this change is completed, it is expected that the cost of haulage by this system will be still further reduced.







A DOUBLE TANK COMPRESSED AIR MINE LOCOMOTIVE.

A TUBE AND FLUE CUTTER.

An improved tube and flue cutter, which is simple and durable in construction, and arranged for cutting flues and tubes of different diameters, has been patented by Mr. Anton Kranzer, of Lidgerwood, North Dakota. By reference to the accompanying illustration it will be seen to consist of a central tapered mandrel, provided with disk cutters which are held in longitudinal dovetailed grooves in said mandrel, and an outer casing provided with suitable openings,

KRANZER'S TUBE AND FLUE CUTTER.

through which said disks project and in which they are adjustably held. To prevent the mandrel from rotating independently of the casing, it is provided with longitudinal grooves which are engaged by corresponding guide strips formed on the inner face of said casing. The upper end of the mandrel is engaged by a feed screw rod which works in the head of the end covering cap. By this means the mandrel is caused to travel in the direction of the axis of the machine, and the cutters are given a lateral motion, their cutting radius being enlarged or decreased as desired. To accommodate the various sizes of tubes, the tool is provided with extra casing tubes which have apertures corresponding to those provided in the main casing, and which can be fitted on over the same. To hold these casing tubes in place an end collar and a cap are provided, and a flanged collar is also slipped on over the opposite ends of the casings, said flange engaging the outer edge of the tube or flue which is to be cut. The tool is rotated by means of a crank arm and ratchet gear. When a tube is to be cut an end collar and a flange collar with casings corresponding to the size of the tube are put on the inner casing and the tool is passed into the tube. The mandrel is driven forward, forcing out the cutters against the tube and the tool is then rotated, the operation being continued until the tube is cut through.

AT a meeting of the fellows of the Royal Botanic Society, in London, on March 28, it was stated, says Science, that since the gardens have been open to the public on Mondays and Saturdays there has been a good attendance, a total of 6,000 persons having attended on eleven of the Mondays. It had been claimed that fellows would resign if the grounds were open to the public, but instead of that the roll of fellows had been greatly increased. The plan of having promenade concerts in the garden has not been favored by the council, but will be again considered.