

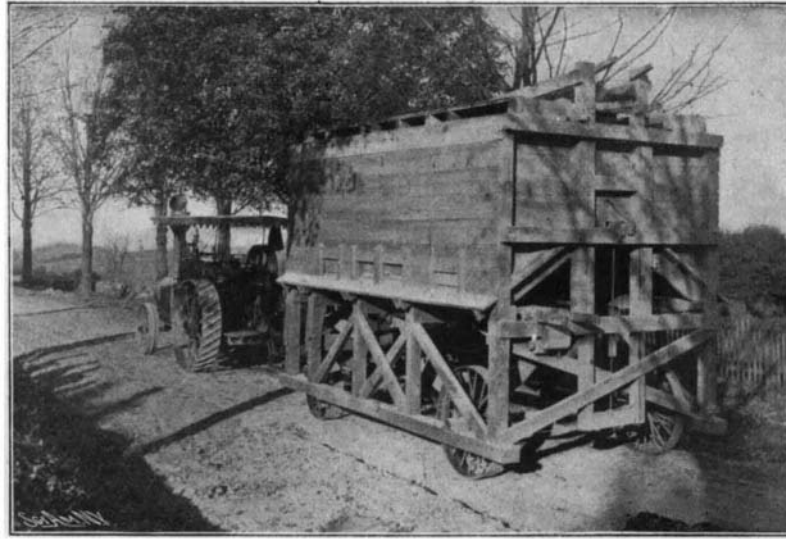
LATEST PROGRESS IN GOOD ROADS CONSTRUCTION.

BY WALDON FAWCETT.

In few, if any, other fields of activity in America has the development of the past few years been comparable, in so far as rate of progression is concerned, with that which has taken place in the sphere of road building. Late progress in undertakings of this class is doubly interesting from the fact that the improvement is equally noticeable in two separate and distinct lines. On the one hand, there has been introduced machinery of greater power and efficiency, which has proven an influential factor in bettering the quality of the roads constructed, and at the same time has reduced the time involved for the operation. On the other hand, much has been accomplished in the evolution of methods to enable first-class road construction at a monetary expenditure lower than has heretofore been possible. The importance of this latter achievement will readily be appreciated, when it is understood that many of the sections of the United States most sorely in need of better roads embrace townships and counties where the value of land and the financial condition of the residents will not justify any heavy assessment upon the taxpayers.

One of the most important steps, from an economic standpoint, has been found in the invention of a road roller which is also a traction engine. A permanent good road cannot be made without the use of a steam roller, and yet the provision of such a machine, available for but one function, involves a rather heavy expenditure. The new combination outfits which have lately been introduced cost only about one-half as much as an ordinary roller, and by reason of the fact that the machines may, by the mere interchange of wheels, be converted from road rollers into traction engines, they can be used for the several purposes of operating the crusher, hauling stone to the road, and rolling the latter.

A machine such as has been described, when in use as a traction engine, will haul at least fifteen tons of stone over an ordinary road. When desired for use as a stationary engine in connection with a stone crusher, the simple unclutching of the driving gear insures its immovability, and power can be secured sufficient for crushing any ordinary rock. Another adjunct of the latest modern equipment for road mak-



A Road-Making Machine.



Stationary Rock-Crusher

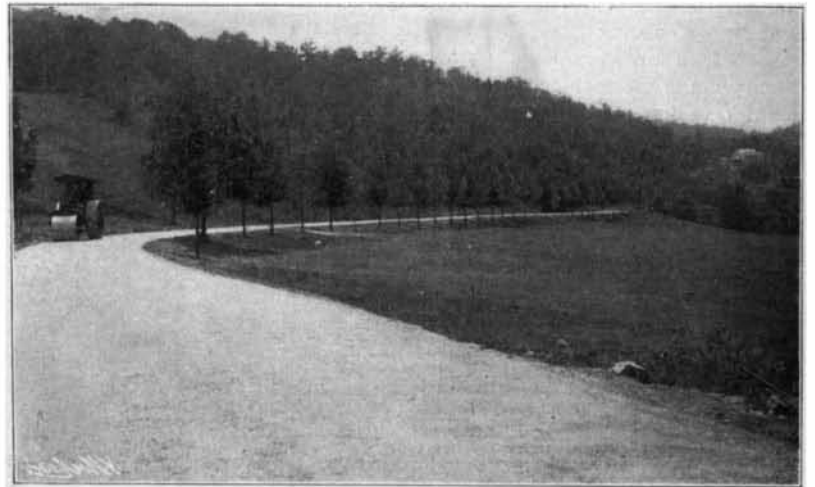
ing is found in a lately devised and very ingenious dump car, with an attachment for automatically spreading on the road any required thickness of stone or gravel. The stone is dumped from the crusher into the car, hauled to any desired point on the road by means of the roller-traction engine, and spread over the surface undergoing improvement much more evenly and rapidly, as well as much more cheaply, than would be possible by the use of men and teams. The dump car may be so adjusted that the sheet of crushed stone, gravel, or sand spread upon the road will be of any desired thickness from one to eight inches. An engine tender with sprinkling attachment fastened to the tank, for use in sprinkling during the rolling process, is also included in this equipment.

Notable advances have been made of late in the provision of complete portable rock-crushing outfits, including not only movable rock crushers, proper, but portable bins on wheels. The latest achievement in this line is found in the roller-bearing truck and folding elevator, in which steel castings for frame lever and jaw of crusher reduce the weight, and roller bearings for the truck wheels reduce the draft, so that a crusher having a capacity of fully twenty tons per hour may be transported with ease. Such an elevator raises the crushed stone fifteen feet from the ground, although the highest point when folded is less than ten feet.

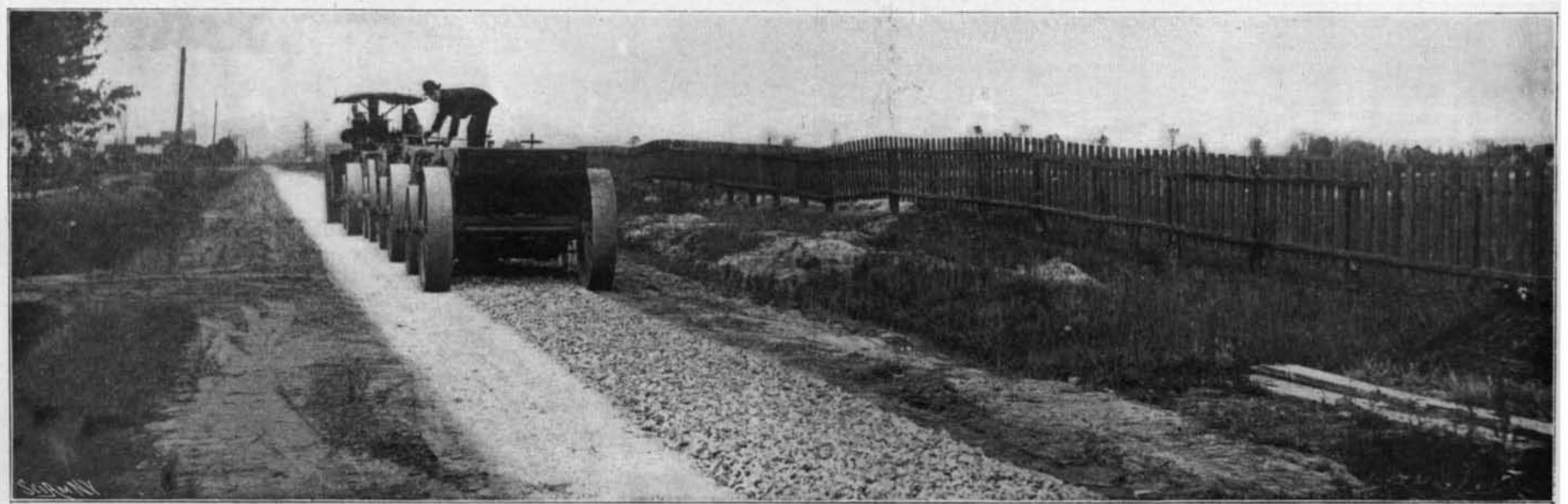
The convenient and economical handling of stone in up-to-date road building demands not only crushers and elevators, but storage bins as well, so that the entire handling of the material may be accomplished without the use of manual labor from the time the stone is fed into the crusher until it is discharged into the wagon or cart. For small crushing plants the portable bin on wheels is now being used almost exclusively. It has a capacity of twelve tons, but when empty weighs but 3,500 pounds. It is made of seasoned lumber, the bottom being lined with steel and the stone discharged through automatic gates. It may be quickly attached to the elevator; in fact, the whole outfit, consisting of crusher, elevator, screen, and bin, may be set and ready for work inside of fifteen minutes. In such equipments the 30-inch revolving screen, preferably six feet in length, is usually used. When a larger storage capacity for crushed stone is required,



Road-Making at Hayward, Wis.



A Finished Road at Hot Springs, Va.



An Automatic Stone-Spreading Machine.

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It is now customary to provide semi-portable bins or skids, ranging in capacity from 40 to 75 tons. These bins are fastened together by bolts, so that they may be quickly taken down for shipment.

Many improvements have been made during the past year in the wonderful dirt elevator, which plows up the earth and lifts the loosened material into wagons or conveys it to the center of the roadway. The dirt elevator consists chiefly of an adjustable frame attached to the rear of the engine. Two rollers are provided, around which is placed a wide, 61-ply, endless canvas belt. The upper end of the frame, as now constructed, is susceptible of adjustment to suit the wagons or to enable the delivery of dirt to the best advantage in grading. When dirt is being delivered to the road grade, a distributing device at the upper end of the frame is utilized, which delivers the earth to any portion of the road desired.

The plow is attached to the axle of the engine, and thus delivers dirt directly to the lower end of the elevator. The adjustment of both plow and elevator is possible of quick accomplishment by means of levers. The latest models of dirt-elevating machine of the general type described are capable of handling from one hundred to one hundred and fifty cubic yards of dirt per hour, according to the soil handled and the total cost of maintenance and operation, with allowance for rental or interest on the investment, which seldom exceeds one cent a yard for the material handled. A recent innovation in this important branch of road-building practice is found in the introduction of special devices for transporting the roller attachment in separate loads over country bridges.

In the field of less pretentious road-building appliances, one of the most interesting productions of late years is found in the reversible steel road machine now coming into almost universal use. In the newest style machine the blade can be shifted outside the wheels on either side of the machine, and still retain its acute angles for cutting down banks and widening roads. The adjustment consists of a system of worm gears, which can be quickly manipulated by the operator while the machine is at work. The stay rod consists of a heavy steel bar, enabling the operator to force the blade in the bank without stopping his machine.

The axles may be extended on both sides of the machine quickly, and thus it is possible for the apparatus to take a cut from the side of the road and move it into the center of the highway without making it necessary for the machine to run over aught but a perfectly smooth surface. Other novelties which have lately been introduced in these machines with a view to contributing to efficiency and economy in road building, include a front lifting device by which the curvature of the moldboard can be changed without stopping the machine, thus preventing inconvenience when boggy conditions or clay or gumbo soils are encountered; a drawbar coupling with full cog circle, which permits the moldboard to be completely reversed should occasion require for the pulverizing of large lumps of earth that are thrown up in the center; and an improved compression spring in the forward end of the drawbar, which takes the sudden jar off the machine and the shoulders of the team, should the machine strike a fast stone or stump. The enhanced efficiency of present-day road-making machinery in general is to be attributed in no small degree to the fact that machines of various kinds are now tested in all kinds of soils before being placed in active service, and road construction is thus devoid of the experimental phase which has heretofore characterized it in each new locality in which it is undertaken.

A Curious Early Invention.

In the *Mechanic's Magazine* of London for December 7, 1839, may be found a patent carriage for descending hills, invented by Thomas Parkin. When the carriage arrived at the brow of a hill, having sufficient incline for the carriage to descend under the influence of gravity alone, the driver, by turning a crank, raised the horse entirely off his feet. The object was to be able to descend at a greater speed than would be possible if the horse had his feet on the ground. The following statement accompanied the description in the *Mechanic's Magazine*:

"Mr. Parkin states that he is aware that the lifting of a portion of the weight of a horse to ease his labor on descending hills has often heretofore been effected in carts by shifting the body of the cart backward on the axletree, and in other cases by taking a part of the loading from the front and placing it at the back of the cart; and also that a method of lifting a portion of the weight of a horse for the purpose of enabling him to increase his speed by striking the ground with his feet without pressing much of his weight on them, has already been made public; he therefore disclaims the partial lifting of a horse either on level roads or on declivities. But he claims the right of elevating the horse entirely off the ground on declivities down which the carriage can run by its own weight; this

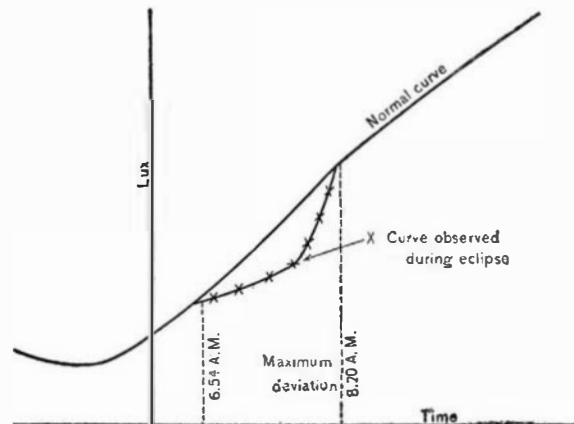
elevation of the horse being combined with a brake to regulate the speed of the descent, or to stop the progress of the vehicle, at any part of the declivity; and in combination also with the turning of the hinder axletree of the carriage to make it go in a curvilinear direction as above particularly described. He further claims the placing of the axletree and fore wheels forward, near or beyond the front of the carriage in this combination, by which the weight of the carriage is thrown so far behind the horses as to more than counterbalance them when suspended."

It would seem as though Mr. Parkin must have been accustomed to deal with very well-trained horses, or else have had an abiding faith in their good nature, for he makes no provision against the horses' kicking at being thus deprived of the use of their legs.

HOWARD A. COOMBS.

A NEARLY TOTAL ECLIPSE OF THE MOON OBSERVED BY MEANS OF PHOTOELECTRIC SELENIUM CELLS.

Herr E. Ruhmer, the well-known experimenter in wireless telephony, some time ago put his selenium cells to quite a novel application, making some records



CURVE TAKEN WITH THE RUHMER CELL DURING ECLIPSE OF OCTOBER 31, 1902.

of a partial eclipse of the sun, which, on account of the heavy fogs prevailing, it would have been impossible to observe by a visual method. As, however, only 0.16 of the diameter of the sun was covered in Berlin on the 31st of October, 1902, only a slight departure from the normal curve of resistances could be recorded. Much more interesting results were therefore obtained with a nearly total eclipse of the moon on April 11-12 last.

Though the direct moonlight would have been quite sufficient to influence the most sensitive selenium cells. Ruhmer employed a parabolic mirror 45 centimeters in aperture in connection with a cylindrical selenium cell, the mirror concentrating the moonlight on the cell placed in its optical axis so as to produce a uniform illumination of the whole of the selenium cell. A small receiving apparatus, such as used to demonstrate optical telephony was then installed in connection with a small telescope, so as to be readily adjusted according to the position of the



RUHMER'S CELL APPLIED TO A PARABOLIC REFLECTOR FOR OBSERVING AN ECLIPSE OF THE MOON.

moon. After short-circuiting the parts shown in the engraving, the cell was connected to the circuit of a small measuring battery and a most sensitive milliamperemeter, allowing of hundredths of milliamperes being easily read.

The graphical record of the observed values of the current intensities obtained is interesting. Apart from some slight fluctuations due to transparent clouds passing before the moon, the character of the curve is of a striking regularity owing to the extreme clearness of the air that greatly facilitated the task of the observer. The luminous intensity and, accordingly, the intensity

of the current was found to increase as far as 11 o'clock of the evening, owing to the increasing height of the moon, when, on account of the moon's coming in contact with the penumbra of the earth, both the luminous and current intensities begin to gradually (from 11 h. to 11 h. 37 m.) decrease, and, after the umbra of the earth is reached (11 h. 34 m.), fall rapidly. The time of astronomical maximum of the eclipse, as calculated, fairly coincides with the minimum of the curve. The second half of the curve shows the same features in a reversed direction, the final decrease being due to the eventual decrease in the height of the moon.

These experiments show the suitability of selenium cells for astronomical purposes. Herr Ruhmer has, moreover, devised automatically registering instruments, allowing of such phenomena being recorded with any degree of accuracy up to several hundreds of registrations per second. The telescope has only to be connected in a convenient way to a parabolic mirror with a photoelectric cell, the registering device being placed in any desired room of the observatory.

A. G.

Cleaning Air by Washing Instead of Filtering.

It has been demonstrated that much the larger share of trouble caused by imperfect contacts in switchboard connections in telephone exchanges can be prevented by proper ventilation of the operating rooms, and that implies thorough cleansing of the air entering them. Many experiments have been tried in the way of dry-cleaning by filtering through screens of wire and cheese-cloth or cotton-batting, but all such devices require frequent renewal, sometimes at considerable trouble and expense. By continued use any filter of this character must deteriorate and eventually become clogged, and in order to avoid the results of neglect it ought to be practically automatic. This point is essential in an air-cleaning system. In the case of one large telephone company very satisfactory results have been obtained by passing the air supply through a fine spray of water and afterward precipitating the moisture with the collected impurities and discharging it into the sewer. The water, which is taken up at high velocity and held in mechanical suspension, is extracted by centrifugal force by passing it through a series of tubes in which spirals are so placed as to give the air a whirling motion, causing the suspended particles, which are heavier than the air, to be thrown outward and brought in contact with the tubes, from which they flow through perforations to a drip-pan below. The washing process imparts about 70 per cent humidity at a temperature of 70 deg. Fahr. in the operating room. This is considered the most desirable for health and comfort, and avoids the excessive dryness sometimes resulting from other systems of heating, and ventilating. Moreover, in summer time, with the temperature outside at 80 deg. Fahr., and with the normal temperature of the city water, the air delivered to the rooms can be readily reduced to 70 deg. This is a supplementary advantage which must appeal at once to sufferers from extreme summer temperatures everywhere, and with the growing knowledge that such an advantage is available will undoubtedly come the insistence that buildings should be kept cool in one season as well as warm in another.—*Cassier's Magazine*.

The Current Supplement.

The opening article of the current SUPPLEMENT, No. 1448, very exhaustively discusses the mining and manufacture of rock salt in New York State. Mr. W. P. Smythe's account of the North Sea fisheries is concluded. New types of machinery for making wagon wheels are described and illustrated. The much talked of fuel competition of the Automobile Club of France is a matter which will doubtless be of interest to our readers. An excellent article on a new form of friction-clutch by Prof. Hele-Shaw describes this most important piece of apparatus, both fully and clearly. Mr. D. A. Willey tells something of the modern craft of metal working, elucidating his text with some striking illustrations. A new type of car is now being used by the Illinois Central Railroad which promises to do much for the safe, rapid, and efficient transportation of its passenger traffic. Constructed as it is entirely of steel, the car could probably not be telescoped in a head-on collision. A full description of the construction of the car appears in the SUPPLEMENT. Sir Norman Lockyer's remarkable presidential address before the British Association on "The Influence of Brain Power on History" is published in full.

A woman who lives on North 9th Street, Philadelphia, Pa., has started a rather novel school for the purpose of teaching parrots how to talk. Instead of straining her throat and consuming valuable time in repeating words for the parrots to practise on, the woman sets a phonograph going, retires to a rocking chair and takes it easy. The phonograph does all the teaching.