

of the total expenses than on ordinary railroads, at least for maintenance of road, because the train movement is extraordinarily great, the trains exceptionally light, and the road exceptionally durable and permanent—no ballasting to keep up, ties uninjured by bad drainage, no liability to floods, only the rails wearing out about as on other roads in proportion to the tonnage passing over them. The average expense per passenger carried was not quite 4 cents (3.92 cents). If a uniform fare of 5 cents had been charged at all hours, which has been strongly advocated by some of the city papers, the net profits (with the same traffic) would have been reduced from \$1,068,150 to \$322,660, or to little more than two thirds of the interest on the bonds. Doubtless a 5 cent fare in the middle of the day would increase the traffic considerable, but certainly not enough to make up the difference in the rate. To do that it would be necessary for the number of passengers to become more than three times as great. As the road already carries at 5 cents during the four hours when traffic always is heaviest, and when the greatest bulk of the necessary travel must be done, there would be no possibility of any such increase; but this does not prove that some modification in rates, which would fill the trains when they now run more than half empty, might not prove profitable. It now costs as much to travel a quarter of a mile on this road as to ride the 8½ miles from the battery to Harlem. On the Third avenue line, which passes through a densely peopled district where most of the residents are not very rich and many are very poor, and which passes close to some of the leading retail centers, most people would rather pay 5 cents to ride a mile, many to ride two miles, and not a few to ride three miles, on the street cars, than pay 10 cents on the elevated road. But it would not by any means be an easy matter to provide for the collection of different rates for different distances on this road.

The enormous net earnings of \$79,122 per mile were all absorbed except \$28,690 by the payments of interest, the 10 per cent dividends on the stock, and a payment of less than \$28,000 to the city of New York as a sort of charter tax. The traffic of this road will doubtless increase (at least till the Second avenue line is opened), but it is not at all certain that the expenses will be so low hereafter, now that prices have risen and after the road and rolling stock have had time enough to wear out a little. The cost of the road and equipment is reported at just about \$1,000,000 per mile; this is the cost in stock and bonds. The contract for constructing it could be, or could have been, let for cash for less than one half of that amount, doubtless.

The Metropolitan Elevated Railway has also rendered its report for the same year, during the whole of which its line from Trinity Church to Central Park was open, and during three fourths of it the line through Fifty-third street giving access to one additional important station, while later, one after the other, it was opened to three or four other stations, only one of which, however, yielded any considerable amount of traffic during the year in question. It shows for the year a profit of \$576,456, while the bonds outstanding at the close of the year require \$304,920 for interest, and the 10 per cent dividends on the stock guaranteed by the Manhattan Company will amount to \$650,000. This, however, will cover a great deal of road not in operation last year, though it can hardly be expected to be as productive as the old road for some years to come.—*Railroad Gazette.*

#### Light Draught Fast Steamers.

The following particulars are given by a correspondent of the *American Ship*: Although there are many points of construction which might be adopted from Eastern steamers with advantage, on the shallow and dangerous rivers of the Mississippi Valley, it is doubtful whether their hull models could be studied with profit. Nearly all the steamers navigating the Mississippi and its tributaries are constructed upon the Ohio. The perfection the builders along that river have attained in constructing vessels of exceedingly light draught may be inferred when we state that, on any day during the navigation season, steamers, having a freight capacity of from 1,000 to 1,800 tons, may be seen at the Cincinnati wharves, which draw less than three feet light. And there are many boats plying the Upper Ohio which trim on two feet, to say nothing of the little low water "dinkies," which can almost "navigate a meadow after a heavy dew."

The Telegraph, a large passenger boat, 288 feet in length, 41 feet beam, and 6 feet hold, draws light, two feet.

The Golden Crown, a fine stern-wheel steamer of the Southern Transportation Line, running between Cincinnati and New Orleans, has a capacity for over 1,500 tons of freight, and trims, with steam up, two feet water.

The Mary Houston, of the same line, side-wheel, draws less than three feet, and carries 1,500 tons.

The Guiding Star, also of the S. T. Line, is over 300 feet in length, and has a capacity for 1,800 tons. She draws 33 inches, light.

The New Natchez, one of the fastest of the big palatial steamers on the Lower Mississippi, is 303 feet long, 46 feet beam, and 10 feet hold. She has 8 steel boilers 36 feet long, 43 inches diameter. Engines, 10 feet stroke, 34 inches diameter; capacity for 2,000 tons freight or 8,000 bales cotton; draws light, less than 5 feet.

The St. Lawrence, an elegant and swift Ohio river side-wheeler, is 270 feet long, carries 1,000 tons, and draws twenty-seven inches. The Pittsburg, stern-wheel, carries over 1,000 tons, and draws only 24 inches.

Many other steamers of equally remarkable draught could

be enumerated had I the space. Many of the small stern-wheelers, navigating the bayous and small tributaries of the Mississippi, draw less than 14 inches, and yet have room for 1,200 or 1,400 bales of cotton. The most necessary improvement in Western steamers, and especially in the boats plying in long distance trades, is an increase of speed. With the exception of a few of the fast palaces on the Lower Mississippi, there are few boats that ever attain 15 miles an hour up stream, and 12 miles an hour is considered extraordinary. Such slow time is unpardonable in an age of rapid transit like this, and, as long as Western river boats continue to disregard the demands of commerce, railways will hold the upper hand in competition.

#### Kroh's Rapid Process.

The formulæ for Herr Kroh's rapid plates is given as follows in the *Photographisches Wochenblatt*:

To one kilogramme of iodide collodion add a quarter of an ounce (= 8.75 grammes) of the following solution: Absolute alcohol seventy grammes, and three to four grammes of isinglass or gelatine cut small and dissolved by heat in a glass containing thirty-five grammes of distilled water; then add four grammes of iodine of potassium and three grammes of bromide of ammonium, and when all is completely dissolved and filtered through a piece of linen previously thoroughly washed in alcohol, pour into a bottle capable of holding about a kilogramme and a half. To a quarter of an ounce (= 8.75 grammes) of the above solution add one kilogramme of iodide collodion and shake thoroughly for eight or ten minutes; then add from eight to ten drops of acetic ether, and the result will be the so-called "cheesy collodion."

*Remarks on the foregoing.*—On the addition of the gelatine and iodine solution there is an immediate, though harmless, appearance of turbidity, and by this addition cotton is precipitated, but may be redissolved by diligent shaking. The iodizer—that is, the gelatineiodizing solution—may be varied according to the state of the light and the position of the studio. If powerful pictures are desired the following should be used:

Iodide of ammonium .....	4 grammes.
Bromide of cadmium .....	4 "
Absolute alcohol .....	70 "
Distilled water .....	175 "

If it be desired to work without intensification, and to have an extremely sensitive collodion, then take:

Iodide of sodium .....	450 grammes.
Iodide of lithium .....	3 "
Absolute alcohol .....	70 "
Distilled water .....	26.25 "

If the collodion be required to work rapidly, but not powerfully, then to one kilogramme of prepared collodion add 0.73 gramme of sublimed iodine. It is as well when pouring off superfluous collodion to let it run into a second bottle. Allow the plate to become perfectly dry before dipping it into the silver bath.

The development is effected by two developers, Nos. 1 and 2:

#### DEVELOPER NO. 1.

Distilled water .....	60 ounces = 2.1 kilogrammes.
Ferrous sulphate .....	3 " = 105 grammes.
Acetic acid .....	3 " = 105 "
Absolute alcohol .....	4 " = 140 "

#### RAPID DEVELOPER NO. 2.

Distilled water .....	60 ounces = 2.1 kilogrammes.
Ferrous sulphate .....	5 " = 175 grammes.
Acetic acid .....	3 " = 105 "
Absolute alcohol .....	4 " = 140 "
Oxalic acid .....	4 to 5 grains = 0.36 gramme.

Developer No. 1 is applied cold. The rapid developer requires that the ferrous sulphate, the water, and the oxalic acid should be heated and properly dissolved in a shallow vessel; when the solution has become cold the alcohol and acetic acid are added, and then the whole is filtered. After the exposure the plate is coated with developer No. 1; when the highest lights have been brought out it is poured off, and then the rapid developer is taken, which immediately brings out the deepest shadows. If soft pictures for intensification be required then the rapid developer should remain a long time upon the plate, and a short time in the reverse case.

#### FIXING BATH.

Water .....	10 parts.
Cyanide of potassium .....	1 part.

#### INTENSIFIER.

Silver .....	17.5 grammes.
Distilled water .....	1 kilo. 35 "
Chemically-pure nitric acid .....	5 drops.
Pyrogallic acid .....	2.75 grammes.
Citric acid .....	1.45 gramme.
Water .....	560 grammes.
Glacial acetic acid .....	17.5 "

After drying the plates, which are not sufficiently powerful, are varnished with common varnish, and then strengthened with the above intensifier. If the plates are blue after being well washed they are coated with a solution of 5.5 grammes of cyanide of potassium in 350 grammes of water, to which from five to eight drops of the intensifying silver have been added (and well shaken) until the surface becomes a bright yellow.

#### SILVER BATH.

60 grammes of iodide of potassium dissolved in 70 grammes water.	
25 " " nitrate of silver .....	420 "
8 to 10 drops of the iodizing solution given above.	
2 drops of nitric acid.	

The bath may be used the second day. The photographer is recommended to prepare three silver baths, and to use a different one every day for three days and then recommence, so that each bath is only used one day in three. In studios where from twenty to thirty sittings are given daily six baths will be required. Time of floating, three minutes. The duration of the exposure should, with a good light, be three-quarters less, and with a bad light a half less, than by other processes.

#### The Erie Canal.

In a recent letter to the New York *Tribune* urging the deepening of Erie Canal, Mr. T. C. Ruggles says:

The reasons why steam has not succeeded better on the canal are, first, the steamer was not long enough; it required either more length itself or another boat to push; and next, the bottom of the canal was not finished to its proper width of fifty-six feet, and to a depth of seven feet for this width at the bottom, so that two loaded boats could easily pass each other. The only way to do on the canals, as the locks would not admit longer boats than those now in use, was to fasten one boat before the other, taking them apart at the locks. This, in fact, has doubled the capacity of the steamer, and enabled the same crew to bring down twice the load for the same price, and has made steam a success. The State Engineer, the Hon. Horatio Seymour, Jr., recommends deepening the canal one more foot; but eight feet deep, though a great aid, will make but little difference in the cost of transportation (about one quarter of a cent a bushel), and no difference in time. If steamer and consort are each to be loaded forty more tons, they will be so deep in the water that there will be but a few inches between the propeller wheel and the bottom of the canal; consequently the steamer and consort will not go over two and half miles per hour, or be eight days from Buffalo to New York. Three feet deeper, with the canal banks raised one foot, will reduce the time to New York to four and one quarter days, instead of eight, and the cost of moving a bushel to one and three quarter cents.

The cost of deepening the canal one foot is estimated by Mr. Seymour at \$1,100,000. From 1868 to 1876 the canal reduced the tolls from six cents a bushel to two cents, but made no improvements in reducing the cost of transportation. The New York Central in the same time was constantly improving its means of transportation. In 1875 and 1876 this road expended \$3,849,270 for depots, engines, superstructures, etc., for the purpose of expediting and cheapening its transportation. The following is the comparative result of the canal and railroad policy:

In 1868 the canal moved tons one mile .....	1,033,751,268
In 1876 the canal moved tons one mile .....	570,969,064
Loss .....	462,782,204
In 1868 the railroads moved .....	366,199,786
In 1876 the railroads moved .....	1,674,447,055
Gain .....	1,308,247,269

The canal lost in eight years nearly half its tonnage, while the railroad in eight years nearly quadrupled its tonnage.

#### The White Wax of Sze-chuen.

Describing some curiosities of trade in China, the *Pull Mall Gazette* gives a number of interesting facts with regard to the production of the white wax of Sze-chuen.

In the Keen-chang district of that province there grows in abundance the *Ligustrum lucidum*, an evergreen tree with pointed ovate leaves, on the twigs of which myriads of insects spread themselves like a brownish film, in the spring of each year. Presently the surface of the twigs becomes incrustated with a white waxy substance secreted by the insects, and it increases in quantity until the latter part of August, when the twigs are cut off and boiled in water. During this process the wax rising to the surface is skimmed off, and is then melted and allowed to cool in deep pans. By one of those curious accidents which have done so much to increase the knowledge of mankind, it was discovered that by transporting the insects bred in Keen-chang to the less congenial climate of Kea-ting Fu, in the north of the province, the amount of wax produced was vastly increased. No people more readily discern a commercial advantage, or more speedily take advantage of one when unencumbered with political considerations, than the Chinese; and this singular effect of removing the insects from a congenial climate to one so uncongenial as to prevent their breeding was eagerly taken advantage of by the Sze-chuen traders. Travelers by night on the high road between Keen-chang and Kea-ting Fu may meet in the spring of the year hundreds of wax merchants, each carrying his load of female insects, big with young, on their way to the wax farms in Kea-ting Fu. The journey is rough and long and a fortnight's sun would precipitate the hatching, which should take place after the females have been attached to the trees. To the unscientific eyes of Chinamen the round pea like female appears to be nothing more than an egg, and this belief is the more excusable since the birth of the young is the signal for the death of the parent, of whose previous existence there remains only as evidence an outer shell or husk. Six or seven of these prolific mothers are wrapped in a palm leaf and tied to a branch of the *Ligustrum lucidum*. In a few days swarms of infinitesimally small insects creep forth and cluster on the twigs of the tree, where they fulfill their mission and perish with its accomplishment in the boiling pot each August. Baron Richthofen considers the value of the annual crop to be on an average upwards of \$3,000,000; and during last year there was exported from the one port of Hankow upwards of \$400,000 worth of it.

#### NEW INVENTION.

Mr. John Rogers, of Eldridge, Iowa, has patented an improved harrow, in which the frame is made in two parts, an upper and a lower, connected together and fitted to move lengthwise upon each other. The teeth are pivoted upon the upper frame, and pass through apertures in the under frame, so that the inclination of the teeth is dependent upon the relative position of the two parts of the harrow.