A New Heliochromic Principle.

BY DR. H. W. VOGEL.

In the heliochromic processes of Ducos du Hauron or of Albert, three negatives are taken through violet glass, green glass, and orange glass respectively, and from each of these a collotype plate is made, and printed with a color complementary with that of the glass, the three colored prints being, as is well known, superimposed on the same surface. In this method, it should be noted, no very great progress has been made; but it may be mentioned that Ducos du Hauron used eosine collodion in taking all three negatives, no matter whether through red, green, or yellow glass.

Now eoside of silver is sensitive primarily for green, less for violet, and least of all for red, and is, therefore, the worst material when the medium is red glass; and one can hardly recognize it as the best when blue glass or violet glass is employed, as the special green sensitiveness is not utilized.

For exposures through blue glass, pure bromide should be the best material; while when red glass, cyanin gelatine plates are indicated.

Another fault of the Ducos method is the apparently arbitrary nature of the selection of printing colors. The rule that the negative exposed through glass of any given color should be printed in a complementary color is inexact, and allows wide latitude. One may say that the complementary color of red is green; but the kind of green is undetermined. As a matter of fact, the complementary color of a certain red is rather blue than green. The author proposes the following:

1. That instead of one single sensitizer being used, this should be varied according to the color of the glass used as a medium.

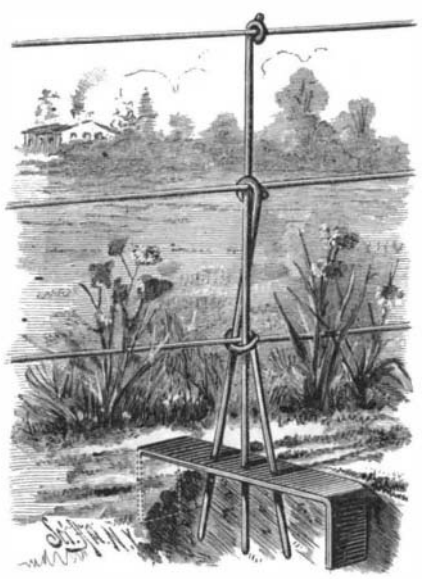
2. That the optical sensitizers shall themselves be used as the printing colors; or, if this be not practicable, that colors having the nearest spectroscopic relations to them be selected.

This last condition will be understood when one considers that the printing colors must reflect those rays which were not absorbed by the sensitive plate.

Up to now we have available a relatively small number of optical sensitizers; but chemical science is constantly bringing new coloring matters to the front, and many of these promise well. Many things which appear difficult to-day, either from an optical or chemico-technical point of view, may be mere bagatelles in ten years' time. Then will the color-sensitive process in photography, and the method of printing in several colors, become a real boon.—*Photo. News.*

IMPROVED FENCE POST FOR WIRE FENCES.

The accompanying illustration clearly shows the principle of a new form of fence post recently patented by Mr. William H. Gates, of Jesup, Iowa. Its base or ground anchor is a single plate of metal about two feet long and two inches wide, the ends so bent down at right angles as to form a top portion some twelve or fourteen inches long, which will rest on the surface when the bent ends are driven into the ground. Through holes in this base plate are forced down bracing and strengthening rods on either side of a higher rod forced down in the center, these side rods being looped at their upper ends to take in not only the central rod, but also any style of fence wire, metallic rib-

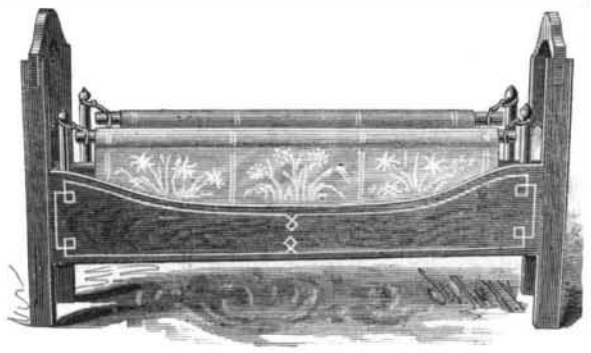


GATES' FENCE POST.

bon, or wire netting support. In building a fence after this plan, after the wires are placed in their several places at the tops of the post rods, the eyes and rods are to be turned or twisted a quarter round or more, to allow the wires to settle into the eyes and be bound fast by them. Light wooden rails may also be bound in the tops of the rods, and, as is obvious, no staples are required in a fence of this style of construction. When the ground is soft or marshy, or of a nature not to give a permanent hold, a pair of metal plates, crossed, is used for the base, with as many holes in them for supporting rods as are deemed necessary to hold the post and fence firmly.

A GUARD FOR BEDSTEADS.

A simple device for preventing children from falling out of bed, and one which is also applicable to cots and lounges, or to the berths of river and ocean steamers, is represented in the accompanying illustration. It consists of guards, each of which is formed of a strip of canvas, cloth, carpet, hammock mesh, or other flexible material, either plain or decorative, attached on its longer sides to bars that extend from the head board to the foot board. Little posts are supported by the side rails or by the head and foot boards, with knobs or catches on their upper ends, for holding the rings or loops of cords connected to the top bars of the guards, to hold them in their raised position. Lift the rings from the tops of the little posts and the guard comes down, and may be pressed under the mattress out of sight, when the posts may be lifted out of the castings; or the whole guard will roll to-



SHELLEY'S BEDSTEAD GUARD.

gether to occupy only a very small space, either in the side of the bed or in any convenient place.

This invention has been patented by Mrs. J. M. Shelley, No. 526 North Fourth Street, Keokuk, Iowa.

Economy of Heavy Locomotives.

In a communication from Mr. R. W. Bushnell, on "Cedar Rapids Shop Notes," valuable testimony is given as to the economy of using ten wheel instead of eight wheel locomotives in railroad operating. Up till two years ago, the Burlington, Cedar Rapids and Northern Railway was operated exclusively by eight wheel locomotives. The road is undulating, and most of the divisions have grades as steep as 60 feet to the mile, so that eight wheel locomotives weighing about thirty-five tons, with cylinders 17x24 inches, seldom took more than eighteen cars for a full train. As the business of the road was steadily increasing, it was decided two years ago to try ten wheel engines for freight traffic. The engines selected were about ten tons heavier than the eight wheelers, and they had one inch more diameter of cylinder, with sufficient boiler capacity to supply the increased demand for steam. These engines did their work with a trifling increase in expense of fuel and repairs, but they hauled from 20 to 35 per cent more cars than the eight wheelers could take over the grades. On an average, three of the large engines would take as many cars as four of the small ones. The saving of one train crew out of four represented an important reduction in operating expenses, but in many cases the saving of wages was of far less consequence than the acceleration of business that resulted from having 25 per cent fewer freight trains on the road. When a single track road is doing a heavy traffic that taxes every facility for moving cars, unavoidable delays are constantly occurring at the numerous meeting points. An improvement in the motive power that enables a given volume of business to be moved by fewer trains reduces the liability of this delay, and practically increases the capacity of the road. There is a limit to the length of trains, beyond which they may be so unwieldy as to cause constant danger from breaking in two, besides leading to the straining and wrenching of the cars from the shocks of starting and stopping, but that objection does not arise till more than thirty eight-wheel cars are on the train.

The objection generally raised on Western roads to increasing the weight of locomotives is the belief that they are hard upon the track and expensive to keep running. In most of the cases this objection rests on a fallacy. A locomotive with three or four pairs of drivers puts less weight per wheel on the rail than an ordinary eight wheel engine. There may be cases where the track and bridges are in such condition that increasing the weight of engines would be dangerous and expensive; but the railroads that are in this condition are happily becoming rare. The race of competition is now so exacting that the only means of carrying freight at a profit is by doing the work with the least possible expense. Using locomotives that will pull heavy trains is a direct move toward economical operating. The figures given by Mr. Bushnell do not, by any means, cover all the saving due to the use of ten wheel engines. He makes no account of the great wear to tires and track that results from the use of the average eight wheel engine, which in bad weather slips incessantly on every hard pull, when the drivers act like milling cutters on the head of the rail. In addition to destroying tires and rails, slipping tears up the fire, throwing away fuel, and it racks every part of the engine's mechanism, leading to the necessity for premature repairs. The proper way to avoid the expense resulting from the use of slippery engines is to employ locomotives with sufficient adhesion; and well designed engines with six or eight wheels coupled have been found most successful in meeting this requirement. If properly designed, a ten wheel engine is greatly superior to an eight wheel locomotive for handling freight trains, but we consider the ten wheeler a compromise inferior in every respect te the Mogul. What is urgently wanted in an engine for freight is sufficient adhesion, with good steaming capacity and ample cylinder power. It seems to us that every pound put upon a four wheeled truck, in addition to what would be necessary for a pony truck, is taking that much weight away from the drivers without any end being gained. When radial trucks came out first, there was more or less trouble with engines that were designed with improper length of radial bar, and that spread abroad the impression that the pony truck was a dangerous device. This old objection has made many master mechanics conservative about using the Mogul engine, even in cases where it would be infinitely superior to any other form of engine for doing their work economically.—*National Car-Builder.*

The Brazilian Navy.

Brazil possesses at the present time five ironclads. The Riachuelo was built in 1883 by Messrs. Samuda. She is 5,800 tons, built of steel, and has steel armor, 10 in. on the turret and 11 in. on the side. Her indicated force is 6,000 horse power, speed 16 knots, and she is armed with four Armstrong guns of 20 tons each, six of 5½ tons, and fifteen Nordenfelt machine guns. The Solimoes and Javany are of 3,600 tons each, and were launched in 1876. They are of iron, and have iron armor, 13 in. on the turrets and 12 in. on the side. Their speed is 12 knots, and they are each armed with four Whitworth guns of 25 tons each and four Nordenfelts. The remaining two ironclads are of 928 tons and 1,196 respectively, and have armor of 4 in. thickness. Brazil further owns a wooden ship plated with 4 in. armor, four small monitors for river service, and seven wooden cruisers. A steel cruiser of 4.000 tons, which is to steam 15½ knots, is at present being built for the Brazilian Government in England. Brazil has also seven wooden and five iron gunboats, and also five composite gunboats in course of construction, besides eight torpedo boats.

A MUZZLE FOR CATILE.

Through the Southern States, and in Florida particularly, there is very little grass for cattle and horses during the fall, winter, and early spring, and farmers would then like to give their stock the advantage of the grass in their orange groves and orchards, but this is not admissible, because the cattle would injure the trees. The same facts apply at some seasons in many other sec-

PRIOLEAU'S MUZZLE FOR CATTLE.

tions of the country, and the accompanying illustration shows a recent invention for obviating the difficulty. The nature of the device will be readily understood from the engraving, one view showing the muzzle on the animal with its head up from the ground, while the other shows the position assumed by the muzzle when the animal bends its head down to feed. The muzzle is divided in two hinged parts, with weights operating to keep these parts closed when the animal's head is lifted, while springs throw the hinged parts open when the weights rest on the ground.

This invention has been patented by Mr. Philip Prioleau, Jr., of Melrose, Fla.