WEAVING DESIGNS by PHOTOGRAPHY

A great many marvellous inventions have been accredited to Herr Jan Szczepanik who was born in a small village in Galicia some 32 years ago. His first invention was a wonderful process, by which one's photograph might be woven in silk almost as quickly as it is now made on photographic paper. The next invention was what seemed an equally incredible method of transmitting one's portrait by telegraphy, and finally it was announced that he had at last solved that problem, which it has been the dream of every photographer to accomplish—photography in natural colours at one exposure.

Apparently little has been heard of the development of Szczepanik's wonderful notions, and consequently, it will surprise many people to learn that the first and last of these inventions

are accomplished facts, whilst the second has been proved, and only temporarily laid aside because of the claims upon the time of the inventor by what he considers more important inventions.

In Bradford a machine is working which performs the marvellous weaving process by which are woven artistic designs and portraits by the aid of photography. The accompanying illustration shows a portrait of Mark Twain reproduced in woven silk from a rough crayon drawing under Szczepanik's process.

During his early years in his native village Szczepanik had watched the weavers in their homes working the hand looms, and he saw what a long tedious process it was to produce any ornamental pattern. The weaving was chiefly of plain material, and when any figuring was required it had to be inserted by the process known as shaft-weaving.

At this time he had never seen a Jacquard loom, but his thoughts led him to practically re-invent Jacquard's principle, and he constructed a loom on exactly the same lines. For this loom it was necessary to use perforated cards, and the old method was to punch them by hand from designs made on squared paper. Even to this day the machines for perforating cards for the Jacquard loom are of the most elementary description, and it takes days to punch a design, as it must be done hole by hole, the operator reading off the number of squares from the design, and dropping a punch when he gets to a place where a hole is required. It is far more slow and tedious even than setting printing type.

Herr Szczepanik revolutionised this part of the process by the invention of the electric card-cutting machine. For this machine a design was originally prepared with varnish or paint on a zinc plate, and this plate was placed on the bed of the machine which was fed forward by means of a screw. The plate passes under a sort of comb with numerous teeth which press on it. Every tooth of the comb is connected electrically with a punch in another part of the machine, and each punch is operated by an electric magnet. It can now be readily understood by anyone with a smattering of electrical knowledge, that when the teeth of the comb are in contact with the bare metal a current passes and the punch is operated, but when the teeth of the comb pass over the varnished parts of the metal where the design exists, no punches are operated, so that it is as if the machine were endowed with thousands of eyes and thousands of fingers, every part of the design being faithfully rendered.

The invention of the electrical card-cutting machine was a splendid step in advance for the weaving industry, but the inventor was not yet satisfied. He had obtained a knowledge of photography and process work, and he saw the possibility of producing the zinc plate designs by photographic means instead of by hand painting or lithographic transfer.

This led him at first to have the black and white designs photographed and printed direct from the negative by means of bichromated fish glue on to the zinc plate. That was a great saving of time: but the crowning point of Herr Szczepanik's work resulted when he applied the half-tone process to the production of the designs, thereby enabling any photograph or picture to be copied without the necessity of calling in the aid of a draughtsman to make a drawing.

It would take up more space than we can allow to describe the process in such detail that the various steps may be followed, but those of our readers who are familiar with the half-tone process, by which the majority of the blocks in this Journal are prepared, will quite understand us when we say that Herr Szczepanik adopts the half-tone principle of using a ruled screen and diaphragms of various shapes projecting on to sensitive paper or plates an image in dots or squares. He at the same time projects the ruling which makes the design look as if it had been drawn on squared paper.

The photographic camera accordingly maps out the design into squares, so that even those who have the old hand-cutting machines can have a design produced more quickly and cheaply than by the aid of the draughtsman, and with the advantage that anything that can be photographed will, in about fifteen minutes, be converted into a weaving design,

Herr Szczepanik obtains varied effects and shaded designs by the use of different diaphragms and screens, all resembling very much the practice of half-tone photography.

WESTINGHOUSE MAGNETIC BRAKE FOR ELECTRIC TRAMCARS.

THE Westinghouse magnetic brake is the outcome of the unequalled experience of the Westinghouse Company, in the manufacture of brakes of all kinds.

It has been designed to suit all conditions of tramway traffic, more especially those which exist in city streets, where it is absolutely essential that cars should be controlled by a brake of the most powerful and reliable description. It is instantaneous in action, and its power can be easily regulated by the driver for ordinary stopping or slowing down, as well as for the shortest stops required in case of emergency. The Westinghouse magnetic brake is, therefore, a combined service and emergency brake. Being simultaneously a track, wheel, and axle brake, it is capable of exercising the maximum braking power which it is desirable to apply to a moving car. Even when—in cases of extreme emergency—it becomes necessary to put the brake full on suddenly while the car is travelling at high speed, the consequent rapid retardation is smooth, and there is an entire absence of the jerking which characterises the action of emergency brakes of other types. The short stops effected by it, while causing no discomfort to passengers, allow the drivers to run their cars safely through congested traffic at higher speeds, and with minimum headway.

On tramway systems where the cars are equipped with the Westinghouse magnetic brake, higher speeds than ordinary have been sanctioned. The effect of higher schedule speeds is that a given service can be maintained with fewer cars, with resulting greater economy in operating expenses, and this means that with a given number of cars the service can be improved,

The action of the Westinghouse magnetic brake is quite independent of the current on the line, and even if the latter be cut off while a car is quickly running down a steep incline, the brake may be applied with equal facility and effectiveness; and one of the characteristics of the brake is that it is as positive in its action at 2 miles per hour, as at 20 miles per hour. Furthermore, its application requires no skill on the part of the motorman.

The Westinghouse magnetic brake consists of:—

A track magnet with detachable soft steel track-shoes fixed to each pole. The shoes run just clear of the rails, and the magnet is energised by current from the car motors acting as generators—brake-blocks, or wheel-shoes of the ordinary type, acting on the wheels. There is a simple link mechanism connecting the track-shoes and wheel-shoes. By means of this the downward pull, and consequent drag on the rails of the magnetised track-shoes, is transmitted to the wheel-shoes, which act upon the peripheries of the wheels in the usual way.

The constructional details of the brake may be better understood by reference to illustration. The track magnet is a horse-shoe with the pole-pieces parallel with the rails, the poles taking the form of renewable track-shoes. The magnet core is horizontal, and the coil is enclosed in a strong water-tight brass sheath. The whole is flexibly suspended by helical steel springs from the truck frame, thus allowing the track-shoes to ride over obstructions. The ordinary clearance between the shoes and the rail is ¼inch. The electrical connections of the magnet consist of strongly armoured cables in duplicate.

The entire mechanism is of the simplest character, and does not in any way interfere with the operation of the hand brake.

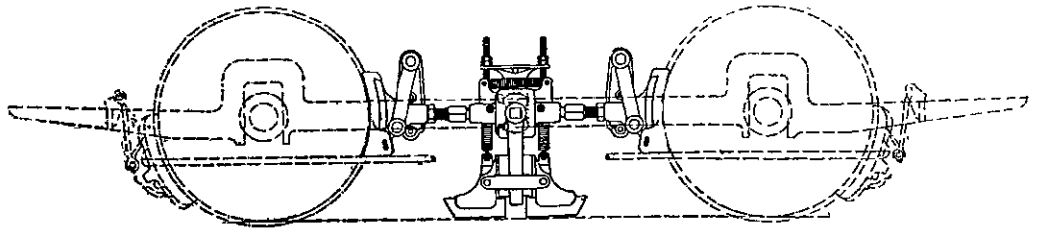
A single truck equipment includes the above three elements in duplicate, a bogie or double truck car being fitted with the equivalent of two single truck equipments. This brake has been successfully fitted to every type of truck in use.

The Wellington and Dunedin tram cars are the only ones fitted with the Westinghouse magnetic brake, in addition to the ordinary ratchet.

Auckland cars have a powerful, but slow-acting shoe-brake, operated on by a ratchet, in addition to the ordinary ratchet brake; while Christchurch cars are equipped with a compressed air brake. also in addition to the ratchet. The standby for all electric systems, but which is seldom used, is the reversing of motors, by which the operation of the controller causes the motors to generate in opposition to one another, and so retard the progress of the car.

On Electrically Propelled Vehicles.

Although their use is at present comparatively limited, vehicles propelled by electric motors, whose energy is derived from secondary batteries, have much in their favour. Not only have they greater advantages in the way of cleanliness, but they are also safer and easier to manipulate than gasoline or steam cars. They are, moreover, less liable to get out of order from ordinary causes, if well constructed and well cared for. But they possess the great disadvantage that the storage batteries must be periodically recharged from some primary electrical source, and their sphere of efficient operation, is, therefore, much reduced. Owing to the scarcity of power-charging stations, it is usually impracticable to make a run of more than forty miles at the most from the base of supplies. This deficiency cannot be counteracted by carrying an extra set of batteries, since these are so immensely heavy as usually constructed, as to greatly curtail the speed and carrying power of the vehicle. It is also impracticable to propel a vehicle by a battery of primary cells carried within it, since a battery of sufficient power to propel the vehicle would have little, if any, advantage in point of endurance over secondary cells, and when once exhausted must be entirely replaced. The plan of mounting on the vehicle a dynamo, to be continually operated by a gasoline engine, has been adopted by one or two manufacturers of electric vehicles. A storage battery is also included for the purpose of equalising the load by absorbing the current not required for propelling the motor, when the vehicle is coasting down hill, or when it is brought to a standstill with the gasoline engine still in operation. It can then supply the extra current required in ascending particularly steep grades or coming through unusually heavy roads.



WESTINGHOUSE MAGNETIC BRAKE.