

the side of the pier over the open hold or the hatchway of the vessel to be filled. At the lower end of the chute a man stands holding the end of a plank which serves as a cut-off to regulate the flow of coal by arresting its motion, so that it will fall regularly, neither overshooting its mark nor entering the hold with a momentum likely to do injury to the vessel's side or bottom. The empty car is at once set in order for the return trip, the bottom valves are closed and locked, the brakes are freed, and the car is turned over to the care of gravity to complete its circuit, guided to the right track by an automatic switch at the river end of the pier. The operation of this switch is shown in Fig. 7. At the extreme end of the pier the track rises to a buffer with a steep upward curve, which arrests the momentum which the car has acquired in running down the grade from the chute, and shifts its line of trend so that it takes the return track either at the side of the pier or in the middle, as the arrangement of tracks may determine.

By this gravity system, from the time a car enters the yard loaded until it stands in line with its empty associates ready to be joined to a train returning to the mines, its circuit of a mile or more calls for human intervention only where it is attached to the cable to be hauled up the slope, and at the delivery chute where its load is almost automatically discharged. At every other point it moves unattended, rolling on a down grade by its own weight. On each side of each pier there are provided perhaps half a dozen chutes whereat vessels may be simultaneously taking in coal. Each pier has thus a capacity for discharging four hundred car loads of coal a day, or two thousand car loads may be delivered at all five piers; this with a working force, men and engines, that would be entirely inadequate by any other system.

A New Steel Process.

Among the various attempts which have been made to improve on the Bessemer process, not the least noteworthy was the idea of using a fixed converter. Such a converter would permit the slag to be run off at an early stage in the blow, by which many advantages might be gained. Hitherto it has been found impossible to prevent the metal from escaping through the tuyeres.

A patent has been taken out by Mr. Griffiths which promises to get over this difficulty. A trial took place on Friday last at the works of Messrs. Nurse, Redbrook, Monmouth, with a small low pressure fixed upright converter capable of holding about one ton; in the presence of some of the leading iron and tin plate manufacturers of South Wales and Staffordshire. Blows were made with a maximum blast pressure of 4½ lb. per square inch, each blow taking only an average of twenty minutes. The yields were good, and the steel produced appears to be of excellent quality, soft and ductile. We have not yet tested its tensile strength, but this we hope to do in a few days. Some of the steel was worked and welded in the presence of those present. We may mention that previous to this trial some twenty blows had been made, the steel of which had all been worked into bars, sheets, and tin plates. No spiegeleisen has been used, the only addition being a little over 1 per cent of ferro-manganese. The advantages claimed by the patentee for the process are its simplicity and small cost of plant, and that no skilled labor is required to handle it. It can be worked by an ordinary blowing engine which will give a maximum pillar of 5 lb. per square inch of blast. A 2 ton converter working ten hours per day ought to make 120 tons of soft steel per week, thus placing a steel-making plant in the hands of small manufacturers. These converters can, it is stated, be increased in capacity up to any size, and worked in duplicate to any extent. An important point in this converter is that it can be worked with four or six tuyeres fixed horizontally. By a simple mechanical arrangement, which we shall illustrate in an early impression, a stopper or plug in each tuyere is actuated by steam or air and shuts the tuyere at the proper time. We may mention that the converter has been constructed by Mr. White, of Pontymister Steel Works, and the trials were carried out under his supervision and that of Mr. George Geen, of Newport, Mon.—*Engineer.*

Solubility of Glass.

We have frequently pointed out how far from correct it is to consider glass an insoluble body; and though, as regards the contamination of solutions by the material dissolved, photography is, fortunately, apparently little troubled, the slightly soluble character of glass concerns photographers in other respects very deeply. Not to speak of the action of moisture in destroying the surfaces of lenses, the manner in which the surface of the glass plates is acted upon is a matter of great importance, so many are the cases where stains in negatives are due to what might be termed "corroded" glass. Before the Chemical Society a paper has recently

been read giving an account of the behavior of glass to certain reagents. The hardest Bohemian glass tubes were selected, and the substances were sealed up and then exposed to heat for some days. The contents were now taken out and analyzed. Passing over the accounts of sulphide of ammonium—which is not likely to be employed to any great extent in the photographer's dark room—we find that



Fig. 3.—IN THE WEIGHING ROOM.

one hundred grammes of simple water dissolved ten milligrammes of the glass, the same amount of strong ammonia from seven to eight milligrammes, and weak ammonia forty-two milligrammes. These are most remarkable results, and by many would be considered as unexpected as remarkable.—*Brit. Jour. of Phot.*

NEW INVENTIONS.

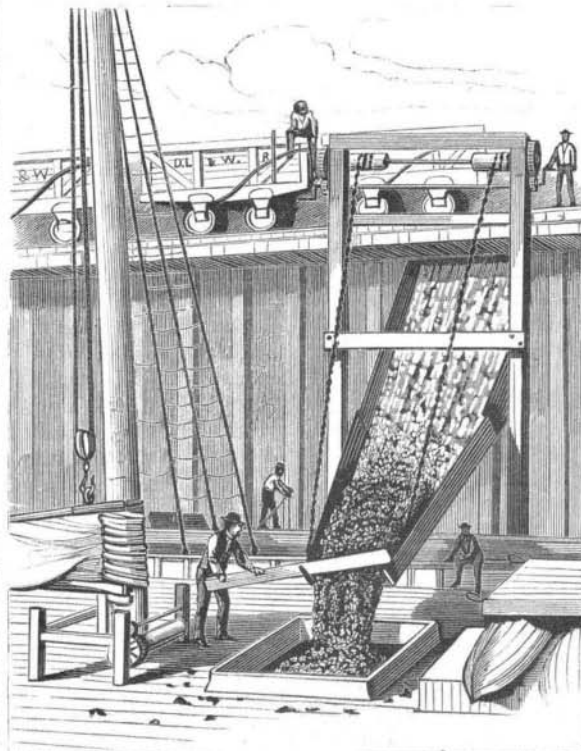
Mr. Joseph W. Blaisdell, of Brooklyn, N. Y., has patented an improved fire kindler, which consists in a paper bag con-



Fig. 5.—ASCENDING THE SLOPE.—SAFETY CHECKS.

taining charcoal, shavings, or other suitable combustible material, the open end of the bag being twisted and then dipped into molten resin, paraffine, or other combustible material, which when hardened holds

the twisted parts of the bag together and forms a very combustible wick for igniting the bag.



THE CHUTE.

A novel blotter has been patented by Mr. Thomas C. Townsend, of New York city. The invention consists in a blotting roller provided with a balanced handle, and formed with a hinged segment that retains the blotting paper in place.

Pipes from water boilers are usually coupled to screw rings or sputs which are attached to the boiler head. Such sputs have been attached by riveting them to the boiler, but they are apt to get loose and leak at the joint. Mr. John Trageser, of New York city, has patented an improved method of connecting sputs to boilers, so that the joint will be perfectly water-tight.

In the class of electric lamps employing the electric arc as a source of light, a common cause of flickering or unsteadiness in the light is the fluctuation of the electric arc by draughts of air. Mr. Henry B. Sheridan, of Cleveland, Ohio, has patented an improvement in electric lamps designed to prevent the flickering due to this cause, and thereby avoid the principal objection to the arc lamp. In carrying out the invention the inventor surrounds the arc and adjacent points of the carbon rods with a small transparent globe provided with a movable support and capable of being closed at the bottom sufficiently to prevent a circulation of air in the region of the electric arc.

Mr. Charles B. Wilson, of Orange, Texas, has patented an improved oil can, which is so constructed that the flow of oil can be regulated conveniently. It is provided with a hollow or tubular handle, having an air vent closed by a removable cap. If the cap is removed from the end of the tube, the air can enter into this tube and the oil can flow from the nozzle. If the flow of oil is to be interrupted the thumb can be placed over or on the end of the tube.

Mr. George H. Richards, of Philadelphia, Pa., has patented an improved back-ground frame for photographers. The object of this invention is to provide folding or closing scenery or back-ground frames united in such manner that several frames are joined and compactly held, and so that any one or more of them may be drawn out and set at the proper angle for use. The invention consists principally of a main frame, in combination with sliding or moving scenery frames. The scenery frames are made reversible, and the main frame is adjustable to different heights.

Mr. George Vollkommer, of Brooklyn, N. Y., has patented a cigar mould press, which is adapted for rapid and easy operation, and it can be extended to suit moulds of different lengths.

Mr. Henry Scholfield, of New York city, has patented an improved apparatus for drying coffee, grain, or evaporating the moisture from various materials, such as green coffee, grain, etc., by heated air. The object of the improvements is to obtain rapidity of action and efficiency of operation, so that the material will be properly dried at small expense and without risk of damage by excessive heat.

Mr. Alonzo H. Savage, of Ashtabula, O., has patented a new and improved box for blacking, etc., which is so constructed that the contents will be prevented from spreading over the rim of the box, and is retained in the middle of the box. This is a screw threaded box for containing the blacking, and is provided with a lid having a large central aperture and an upwardly projecting threaded flange, the threads of which engage with those of the box. The lid is provided with a handle for turning it into the box, and has a scraper on its lower surface.

Mr. Robert W. Teese, of Parker's Landing, Pa., has patented an improved safe having an open bottom compartment at its key-hole end adapted to cover the key-hole. The lock cannot be picked, as the compartment is too small to admit tools, and a person cannot see the lock from the compartment even if it would be possible to pass the tools into it. The lock cannot be blown open, as no explosives can be introduced unless a hole is drilled through the cover or door.

An improved cake pan frame has been patented by Mr. W. J. Cashen, of Portland, Conn. The frame is formed and the whole number of completed pans secured in the frame by two simple operations. After the pans and frame (now a single utensil) have been taken from the uniting press or die the whole may be retined to make a better finish at the joints of the pans and frame.

An improvement in adjustable buggies has been patented by Mr. William T. Angus, of Sydney, New South Wales, Australia. The object of this invention is to construct buggies in such a manner that they can be readily adjusted as a single-seated vehicle or a two-seated vehicle.

Mr. William H. McKenzie, of Waverly, O., has patented a folding clothes rack which occupies but very little space and from which a large quantity of clothes can be suspended. The rack has three or more vertical rows of longitudinal rods or bars when lowered, and a large quantity of articles can be hung on the rack, and when not in use the rack can be folded compactly.