Peary in Greenland.

Lieutenant Peary has heroically remained in Greenland to carry on the work of exploration for another year. To any one familiar with Arctic exploration the situation is perfectly clear. As has happened often enough in the past, the weather and conditions of one season have proved no criterion of the weather in a succeeding season. Kane pushed the Advance north into Smith Sound with little difficulty. For the next two years the ice was solid about the vessel. His second summer he was able to leave the vessel in boats. The first summer his exploring party was stopped, its members frostbitten, and the Advance turned into a hospital by a storm which was precisely like that which overwhelmed Lieutenant Peary on his trip to Independence Bay on a track which he crossed with no danger whatever two years before. The vessel which took up the Greely party went the length of Smith Sound and beyond as easily as a vessel goes up the St. Lawrence in summer. The vessel which went to Greely's relief was crushed before it entered Smith Sound.

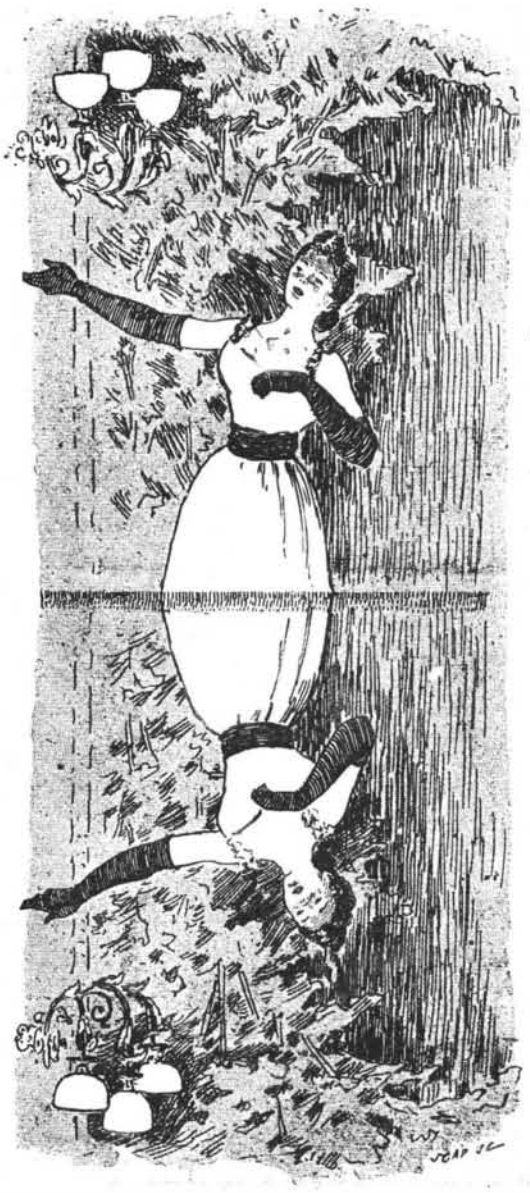
These are the constant risks and hazards of Arctic exploration. In a year of general disaster Lieutenant Peary has faced them all with success. His theory that northern exploration is safer on the ice cap than elsewhere is demonstrated by his safe return after the most terrible storm recorded in Arctic annals as much as it was proved by his success in crossing Greenland in 1892. In a good season, on this route, extended exploration is possible and in a bad season a safe retreat. With the daring, energy, and perfect self-command he has always shown, he has used his advance this year to cache supplies for his advance next summer. In the interval between his return to the coast and the appearance of the Falcon he was accumulating supplies with an energy which suggests what might have been done by other Arctic parties in the same region. No previous explorer has recorded a tidal wave such as destroyed part of his stock of fuel, the tides being unusually stable on the Greenland coast. Even with this disaster the expedition endured nothing not familiar in all Arctic expeditions. In short, Lieutenant Peary has shown the same ability in the face of untoward conditions which he has displayed under more favorable circumstances.—Philadelphia Press.

ARTIFICIAL MIRAGES.

Midsummer is the season that in our climate most readily permits of the observation of mirages. As well known, what we designate by this name are symmetrical and inverted images of objects that are seen, under certain atmospheric conditions, as if reflected from sheets of water. The phenomenon is frequent upon the plains of Egypt. It gives rise to the most startling illusions, and we well know the cruel deceptions that, during the campaign in Egypt, were experienced by our soldiers when, in the extreme heat of the day, they ran exhausted by thirst and fatigue toward the villages that they saw emerging from large chimerical lakes. Such distresses were good for some thing at least, for we are indebted to them for the first scientific explanation of the phenomenon, which was given by Gaspard Monge. Struck by the rays of the sun, the sand becomes exceedingly hot, and the heat is communicated to one after the other of the different strata of air, but it is those that are nearest the earth that are the hottest and lightest. The heat and lightness of the strata continually diminish in ascending.

If a luminous ray, such, for example, as that which is emitted by the top of the palm tree of our figure, traverses them from top to bottom, it will be more and more deflected from the vertical by the lighter and lighter strata. Its behavior will be just the reverse that of the ray that is sent to us by the sun, and which, traversing heavier and heavier strata of air in measure as it draws near us, tends every time to approach the vertical and makes the orb appear to us further above the horizon than it really is. In short, our luminous ray, through the curved route traced in the figure, will finally meet the surface of separation of two strata, and, as it will meet this almost in grazing it, it will not traverse it, but will be reflected, and thus, in rising, reach the eye of the observer, who will see the image of the object upon the prolongation of the ray (that is to say, inverted and symmetrical upon a white background due to the brightness of the sky), and having the appearance of a beautiful lake. Our figure represents an experiment that has recently been made with a view to reproducing a mirage by photography.

A very even plate of sheet iron is taken and placed horizontally upon two supports. The plate is heated very uniformly and sprinkled with sand. Then a small Egyptian landscape is arranged at one end of the plate and the eye or the photographic instrument is so placed that the visual ray shall properly graze the



A MIRAGE IN A CONCERT HALL.

plate. A mirage can be obtained still more easily, when the air is very calm, by lying flat upon the stomach upon a road or well heated sandy lane. In placing the eye very near the ground one can obtain an inverted and symmetrical image of sprigs of grass, pebbles, etc. This is a diversion that may agreeably break the monotony of long hours of revery in the country.

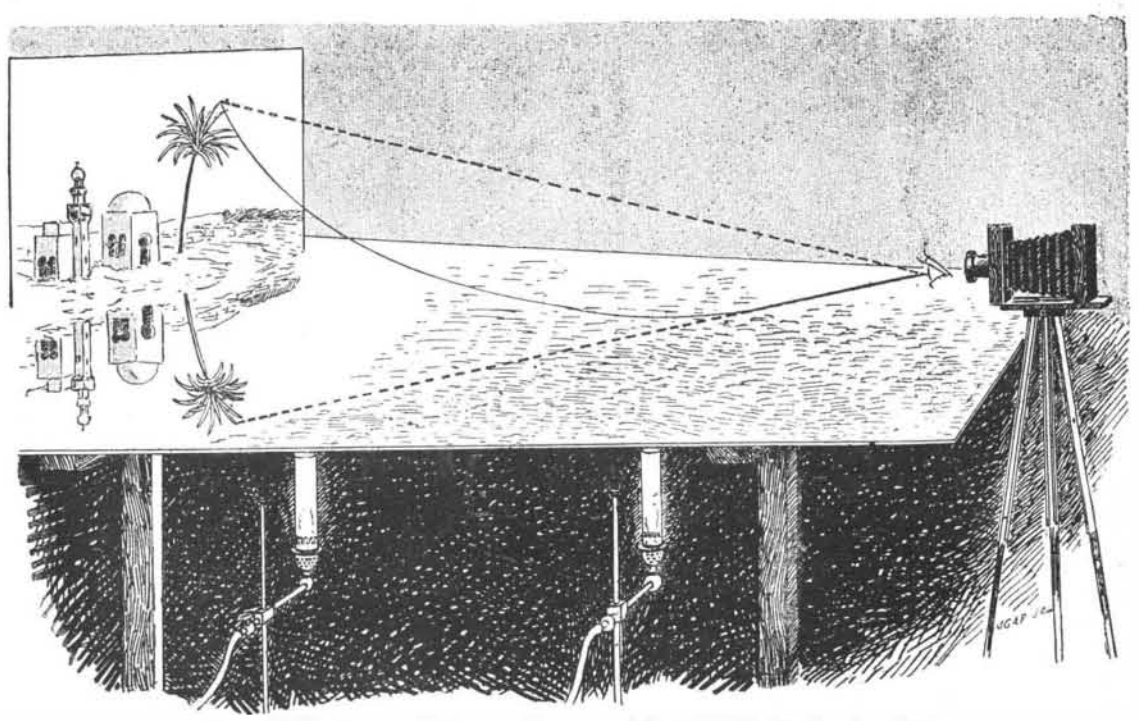
In a music hall and in well-lighted places, in the evening, it is thus possible to vary an often monotonous show and create new surprises for one's self. With the greatest care, and without mixing them, superpose in a glass two liquids that are capable of gradually uniting at their surface of separation, such, for example, as water and lemon sirup. Now look at the diva through the stratum of the liquids that have just mixed, and the spectacle will be fantastic. Our figure is capable of giving but a very incomplete idea of it. This experiment, like the one first described, is a practical demonstration of Monge's principle and of the value of his explanation.—Le Monde Illustre.

The Japanese Victory.

The first serious engagement between the Chinese and the Japanese forces in Corea has resulted, as competent judges have foreseen all along, in the complete victory of the latter. The strong position of Ping-Yang, lying north of the Tatong River, on the road from Seoul to Mukden and Pekin, was carried by assault in the small hours of Sunday morning, September 16, 1894. The Chinese troops who held it, to the number, it is reported, of 20,000 men, were routed with a loss in killed, wounded, and prisoners estimated at four-fifths of their entire force. The residue are said to be scattered in all directions, and the victors are stated already to have dispatched a flying column to seize and occupy the passes between Corea and China to the north. There never was much question that, if the Japanese could manage to get to close quarters with their opponents before the winter set in, they would succeed in inflicting upon them a severe defeat. It has long been known, on the authority of military experts, that their infantry and artillery at any rate are in a high state of efficiency. The men themselves are hardy, active, brave, and intelligent. Their drill and discipline have been carefully adapted from the best European models. Their arms are of the latest and most destructive patterns that science has devised, and every detail in their equipment and accouterments has been thoroughly thought out and carefully provided. The officers who have had the skill and the energy to create such a force are, it need hardly be said, worthy to lead it. All of them have made a scientific study of their profession, and some among them have devoted themselves to a close investigation of the more famous European military systems, under the guidance of distinguished strategists. But, while it was evident that such an army, so led, would have an easy task in defeating and dispersing any force which the Chinese were likely to assemble against it at short notice in Corea, it was by no means certain that the Japanese could force on an engagement before the Corean winter made serious operations impracticable. The Japanese commander has shown that he has mastered the great secret of modern warfare. He has known how to move his troops with rapidity and with precision, and by doing so he has succeeded in dealing what is undoubtedly a heavy blow to China with trifling loss to himself.—London Times.

Velvo-Carbon Batteries.

By invitation of the Battery and Motor Company, a number of scientific experts were present lately at the company's works, on Petersham Island, Richmond, to witness the application of the velvo-carbon principle to launch propulsion. The Velvoca, which has been specially built, is a 35 ft. open boat, and has a beam of 6 ft. 6 in. The batteries, weighing 14 cwt., are placed in the center, and have a cover which can be utilized for a seat, so that no space is wasted. Velvo-carbon, it should be stated, is a special class of negative electrode for electric batteries, consisting of ordinary carbon with a surface of carbonized cotton velvet. Batteries employing these carbons were shown to be both light and powerful, and may be used with a weak solution of sulphuric acid only as an excitant. The patent incorrodible connections are made of pure silver or platinum, and owing to their form, are cheaper than the connections used hitherto, both in first cost and in maintenance. Trial was made of the Velvoca at full speed and at half speed, and it was stated that she could be charged to run for a few hours at half speed if so desired. It is claimed that velvo-carbon for electric launches possesses many advantages over the existing system.



ARTIFICIAL REPRODUCTION AND PHOTOGRAPHING OF A MIRAGE.

Recent Eruption of Kilauea.

This great volcano has been active for several months past, the principal characteristic being a remarkable rise and fall of melted lava within the crater. L. A. Thurston gives the following among other particulars in the Pacific Commercial Advertiser. In March, 1894, the lava had risen almost to the top of the crater, the rise being 447 feet in 19 months.

On the evening of July 6, a party of tourists found the lake in a state of moderate activity, the surface of the lava being about twelve feet below the banks.

On Saturday, the 7th, the surface of the lake raised so that the entire surface was visible from the Volcano House. That night it overflowed into the main crater, and a blow hole was thrown up some 200 yards outside and to the north of the lake, from which a flow issued. There were two other hot cones in the immediate vicinity which were thrown up about three weeks before. On Sunday, Monday and Tuesday, July 8, 9 and 10, the surface of the lake rose and fell several times, varying from full to the brim to 15 feet below the edge of the banks.

On the morning of the 11th the hill was found to have sunk down to the level of the other banks, and frequent columns of rising dust indicated that the banks were falling in. The lake had fallen some 50 feet, through the escape of the lava by some subterranean passage, and the wall of the lake formed by the hill was falling in at frequent intervals.

The lava in the lake continued to fall steadily, at the rate of about 20 feet an hour from 10 o'clock in the morning until 8 in the evening. There was scarcely a moment when the crash of the falling banks was not going on. As the level of the lake sank, the falling rocks of the banks, undermined by the escape of the lava, caused a constantly increasing commotion in the lake as they struck the surface of the molten lava in their fall. A number of times a section of the bank, from 200 to 500 feet long, 150 to 200 feet high, and 20 to 30 feet thick, would split off from the adjoining rocks, and with a tremendous roar, amid a blinding cloud of steam, smoke and dust, fall with an appalling down-plunge into the boiling lake, causing great waves and breakers of fire to dash into the air, and a mighty "ground swell" to sweep across the lake, dashing against the opposite cliffs like storm waves upon a lee shore.

Most of the falling rocks were immediately swallowed up by the lake, but when one of the great downfalls referred to occurred, it would not immediately sink, but would float off across the lake, a great floating island of rock.

As the lava subsided, most of the surrounding banks were seen to be slightly overhanging, and as the lateral support of the molten lava was withdrawn, great slices of the overhanging banks on all sides of the lake would suddenly split off and fall into the lake beneath. As these changes took place the exposed surface, sometimes 100 feet across and upward, would be left red hot, the break, evidently, having taken place on the line of a heat crack which had extended down into the lake.

From 6 to 8 o'clock the entire face of this bluff, some 800 feet in length and over 200 feet in height, was a shifting mass of color, varying from the intense light of molten lava to all the varying shades of rose and red to black, as the different portions were successively exposed by a fall of rock and then cooled by exposure to the air. During this period the crash of the falling banks was incessant. Sometimes a great mass would fall forward like a wall; at others it would simply collapse and slide down, making red-hot fiery landslides; and again enormous bowlders, as big as a house, singly and in groups, would leap from their fastenings and, all aglow, chase each other down and leap far out into the lake.

The awful grandeur and terrible magnificence of the scene at this stage are indescribable. As night came on, and yet hotter recesses were uncovered, the molten lava which remained in the many caverns leading off through the banks to other portions of the crater began to run back and fall down into the lake beneath, making fiery cascades down the sides of the bluff. There were five such lava streams at one time.

The light from the surface of the lake, the red hot walls and the molten streams lighted up the entire area, bringing out every detail with the utmost distinctness, and lighted up a tall column of dust and smoke which arose straight up. During the entire period of the subsidence the lava fountains upon the surface of the lake continued in action, precisely as though nothing unusual was taking place.

Russian Iron Production.

A consular report issued recently on the iron industry of European Russia states that during the past twelve years the output of pig iron has more than doubled, rising from 460,000 tons to 1,060,000 tons, and the combined output of wrought iron and steel has risen from 575,000 tons to 1,000,000 tons. A notable feature is the increased pace at which the production rises during the closing years of this period, marking the decisive expansion of the home industry at the expense of imports. Thus, pig iron rose at the rate of 16,000 to 24,000 tons a year up to 1886, after which the yearly increase is 48,000 to 80,000 tons, and from 1889-90 to 177,000 tons. Steel fell after 1881, an abnormal year, owing to the issue of great government orders for steel rails; shows no advance from 1883-89, but between 1889-92 rises from 253,000 tons to 516,000 tons. Wrought iron is stationary from 1884-88, and rises constantly up to 1892. A corresponding movement is noticeable in imports of pig iron, which from 1886-91 fell from 258,000 tons to 80,000 tons, and of wrought iron, which rose up to 1890, and from 1890-92 fell from 93,000 tons to 49,800 tons. The import of steel rose up to 1890, and from 1890-91 fell from 16,000 tons to 12,900 tons. While the gross production of steel rose from 1882-92 from 242,000 tons to 516,000 tons, the manufacture of steel rails shows little change (153,000 tons in 1882 to 182,000 tons in 1892). Nearly half the total weight of steel prepared in Russia is used in the manufacture of steel rails.

RECENTLY PATENTED INVENTIONS.

Engineering.

INCREASING CRANK THROW OF STEAM ENGINES.—Henry I. Schanck, Holmdel, N. J. According to this improvement there are two cranks on the main shaft joined by a heavy wrist pin on which are two eccentrics, and on the outer end of the piston rod is a longitudinally channeled and slotted crosshead, there being a heart-shaped cam block in the channel, a transverse cam shaft fast in the cam block and loose in the slots of the crosshead, while there are guides for the crosshead, cranks on the ends of the cam shaft, rods between the cranks and the eccentric straps, and a main forked connecting rod. The improvement is more particularly applicable to high pressure, quick speed, horizontal and upright engines, and is designed to increase their efficiency.

SECTIONAL BOILER.—Harry A. R. Dietrich, South Bethlehem, Pa. This is an improvement on a former patented invention of the same inventor, the improved boiler being designed for steam or hot water heating, and particularly adapted for heating buildings by hot water circulation. A particular feature consists of a hollow bottom wall, affording an extended heating surface which receives heat from the ash pit and from a central heat conduit, and there are throttle gates so controlling the heat currents that increased absorption is secured for the water in the legs of the boiler sections. The main heat conduit and flue connections insure extended contact of the heat currents with water-heating surfaces, increasing the efficiency of the boiler and conducing to economy of fuel.

STEAM BOILER.—Harry H. Kelley, Elyria, Ohio. This boiler has a steam drum from which depends a shell containing a cylinder perforated at its lower end and adapted to receive the feed water, there being a specially constructed water circulating pipe exteriorly on the shell. The shell is made in sections, heads held on the end sections being connected with each other by stay bolts, the upper head opening into the bottom of the boiler, and the shell depending into the boiler furnace, while the cylinder is suspended within the shell from the lowermost head.

Railway Appliances.

TIE PLATE.—Walter H. Wilson, New York City. This is a plate for preserving wooden ties by preventing checking, etc., and also preventing the rail from shearing or grinding the spike heads. The plate has on its upper surface a rail seat and its under side is concaved in a direction longitudinal with the rail seat, while there are cutting edges at the sides of the concave for entering the tie. The plate is of comparatively light weight, has spike holes, and the metal is upset in such a way that the plate may be quickly and securely applied and will embed itself in the tie.

APPLYING HOSE TO COUPLINGS.—Peter Whyte, Meridian, Miss. For connecting air brake pipes this inventor has devised a simple and efficient apparatus for applying the screw clamps which fasten the hose sections to the nipples. Combined with a reciprocating hose clamp having tapered jaws fixed on yielding arms, whereby they are adapted to move toward or from each other laterally, is a tapered socket adapted to receive the jaws and close them upon a hose, with means for forcing the clamp forward into the socket, and a device for holding the nipple.

Electrical.

VOLTAGE REGULATOR FOR DYNAMOS.—Malcom P. Ryder, New York City. This is a simple device which, in connection with a rheostat, operates automatically to maintain a constant voltage in the line, the arrangement being such that the rheostat may be operated by hand without interfering with the system. Combined with a regulator magnet and swinging armature is a circuit breaker actuated by the armature and comprising a slide plate on which is an insulated conducting block, while conducting springs secured to a stationary support are adapted to contact with the conducting plate. When the improvement is applied to the alternating system, the controller is connected to the station transformer and the current to operate the regulator magnets is taken from the exciter.

REGISTERING MECHANISM FOR LIGHT CIRCUITS.—William McNiell, Chicago, Ill., and James H. Tinder, Winchester, Ky. This is a positively acting mechanism for indicating the lamp hours to be charged to the consumer. Combined with a star wheel is a sliding swinging bar carrying pallets moving in right lines that are not parallel one with another, there being electro-magnetic mechanism for reciprocating the bar, and registering and carrying wheels and number disks.

CLOSED CONDUIT FOR RAILWAYS.—Charles D. Tisdale, Boston, Mass. According to this invention the main conductor is inserted in a tube of flexible material, upon which is placed an auxiliary sectional conductor provided with contact pins extending through the walls of the tube in position to be brought into contact with the main conductor when the auxiliary conductor and the tube are compressed by the trolley carried by the car. It is designed in this way to facilitate making local connections with the main conductor, and avoid the dangers attending the use of an exposed main line.

CAB SIGNAL FOR RAILWAYS.—Edgar C. Wiley, Bristol, Tenn. This is an improvement on a formerly patented invention of the same inventor, where an alarm bell on the locomotive has a local battery and circuit connections operated by induction through magnets along the roadbed. The present invention employs an ordinary make-and-break circuit bell, supplements the weakness of a relay operated by induction, and saves waste in the battery power for energizing the inducing magnets by a novel construction and arrangement of circuits, batteries, and their connection with the various mechanical parts.

Mining.

SETTLING TANK.—Daniel W. Fall, Frank B. Wineland, and Samuel L. Richards, Breckenridge, Col. This tank has partitions for classifying the slimes in the treatment of ores, and an agitating fan or wheel creating within the tank a regulated current, forcing the floating slimes to travel over all of the partitions and to one end of the tank. It also has a valve to control the discharge of sand and water, the force of which is used to drive the fan or wheel. A second tank receives the floating slimes beneath the surface of the water, a part sinking to the bottom, and the tank having an overflow chute so arranged that only a fluid will pass.

Mechanical.

WELL DRILL.—Charlie M. Lindholm, Rancho, Texas. This invention relates to deep well sinking apparatus, providing a drill arranged to automatically expand in the bottom of the well below the tubing, cutting a hole large enough for the tubing without requiring a second drilling or reaming. Two bit parts are arranged on opposite sides of and inclosing the shank, to which one of the parts is rigidly secured, while the other is pivoted to the shank, the cutting edges of the bits being flush with one another, and the rear end of the pivoted bit section having a bevel engaged by a spring secured to the shank.

TYPE FOUNDING MACHINE.—Auguste Foucher, 71 Boulevard Voltaire, Paris, France. This is a machine to cast two types simultaneously, having two models and two finishing mechanisms, the moulds and their sprue breaking, body dressing and finishing mechanisms being arranged in sequence, but echeloned in different vertical planes, while the corresponding moving parts are rigidly coupled together to be moved simultaneously in the same directions. All parts of the machine may be overlooked by the operator, and two finished types are made at each cast instead of one. The invention is an improvement upon an invention patented in 1887.

Miscellaneous.

ICE VELOCIPEDE.—Dan G. Bolton, Cooperstown, N. Y. The frame of this device is supported by single front and rear runners, to which it is connected by horizontal pivots, while a spiked propelling chain traveling along the under surface of the rear runner is driven from a pedal shaft by a spocket wheel mounted on the pivot connecting the runner with the frame. The runners are capable of sufficient rocking motion to permit passing over uneven ground, and the front runner is turned for steering purposes by a handle bar. The machine is designed to enable a rider to travel over snow and ice at a high rate of speed.

PRINTING ON GLASS, ETC.—Alfred Brookman, New York City. To give clean and distinct impressions of the designs without danger of breaking the articles printed upon, this inventor has devised an apparatus in which two beds having independent sliding movement may be separately actuated, a transfer pad being pivotally mounted on a slide arranged between the beds and adapted to be locked to either of them to slide therewith, while rollers journaled in stationary bearings contact with the transfer pad during the sliding movement. The rollers may, if desired, be employed for printing, in connection with the movable beds, without the pad, the rollers then having an air cushion, over which is canvas and a covering of printers' roller composition.

DECORATING GLASS, ETC.—James Budd, New York City. For the production of signs, letters, and ornamental designs on glass or enameled surfaces by acid or sand blast processes, this inventor has devised an improved method of producing and applying the necessary protective coating, which consists of an adhesive powdered and fibrous material. A roller covered with printers' roller composition is employed to apply the coating, the design on a block or plate being first inked with a varnish and picked up by the roller for transfer to the surface to be coated, and the coating thus transferred being dusted with the finishing covering to enable it to resist the acid or sand blast. The improved method is designed to give better results, and at a lower cost than the processes heretofore followed.

COAL SCREEN.—George W. Cross, Pittston, Pa. This screen is particularly adapted for picking or separating slate from the coal, and is made of series of segments or sections having longitudinal alternate troughs and ribs, the walls of the ribs converging at their upper edges and the troughs having in their bottoms slotted perforations. Both the troughs and the ribs diminish toward the lower end of the segments, meeting near the lower end a flat slotted surface from which is projected a slotted flange. Flat or slab coal will be likewise screened as well as the slate by this screen.

OPEN GRATE HEATER.—John Lawlor, Brooklyn, N. Y. This improvement may be used in connection with an ordinary open fireplace, and may also be readily employed as a portable heater. It provides for thoroughly ventilating a room, relieving it of heavy and impure air, insuring a uniform, perfect draught and complete combustion, without the use of a blower, while preventing the heat and smoke from escaping directly into the chimney flue. When used independently of an open fireplace, a heater casing is employed, adapted to rest on the floor or hearth, when convenient connection may be had with the smoke flue.

DOOR HANGER.—Theodore C. Prouty, St. Joseph, Mich. This invention relates more particularly to double track hangers for sliding doors, providing for such service a cheap and durable ball-bearing hanger, to be struck up from sheet metal. The hanger may be used in connection with the ordinary double-way wood tracks, and the carriage is adjustably connected to the door to receive a shaft centrally mounted on two rows of bearing balls, one on each side of its middle, the two ends of the shaft receiving the supporting wheels. The hanger is adjustably connected to the door to permit of properly placing the door vertically with relation to the supporting track.

WAGON BRAKE.—James W. Brubaker, Tracy, Iowa. The back pressure on the pole as the wagon descends a grade, according to the improvement patented by this inventor, operates to draw forward a connecting rod and forcibly set the brakes, but the wagon may be backed without setting the brakes on setting a simple form of brake latch. The brake bar is normally held set by a spring when the wagon is at a standstill, in opposition to which the draught devices act when the draught is on, and in conjunction therewith when the draught strain is off, so that the greater the back pressure, with a heavy load, the harder will the brake be applied.

HALTER.—Edward P. Waters, Roseville, Ill. This halter is very similar to the ordinary five-ring halter, but is inexpensively made, substantially of a single piece, doubled upon itself to form a nose band, extended in opposite directions through a ring and formed into chin pieces, doubled to form cheek pieces and its ends overlapped to form a crown piece, the ends being made fast to the chin pieces and the cheek pieces at their junctions, bit rings being held in the lower ends of the cheek pieces.

FIRE ALARM.—John P. Williams, South Pittsburg, Tenn. The alarm mechanism devised by this inventor comprises a main wire passed through the several rooms of a building and having a series of fusible joints, alarm bells being connected with the wire, which has weights or tension devices at each end. When the wires separate, the sections are drawn outward and the bells connected are operated. Supplemental portions are provided with loop sections and pivoted tripper devices to normally hold the bells from ringing, and, where the devices are used in a large building, one end of each of the wires preferably leads to an indicator in the office, to locate the floor on which the fire occurs.

HOTEL REGISTER.—David F. Riegle, Portland, Oregon. As an improved article of manufacture this register has its covers provided, beyond the leaves, with separable hinged extensions containing transparently covered advertising panels, the arrangement being such that when the book is filled and filed away the extension may be severed from it. Advertisements on the outer and inner faces of the extensions