

Berliner's Advice to Inventors.

How an inventor ought to invent is told by Emil Berliner, himself well known for his improved telephones and sound-recording devices, in a recent number of the Saturday Evening Post.

"I had for years been studying the science of electricity and the physics of sound when Mr. Bell's patent was issued in 1876," writes Mr. Berliner, "and it occurred to me at once that the knowledge I had absorbed in my studies might be very profitably applied to improve the telephone. At that time I was engaged in commercial pursuits in Washington, and my experiments and studies were more in the nature of a recreation than anything else. I paid frequent visits to the central office of the Fire Department, the electrical superintendent of which, Mr. Richardson, was a particular friend of mine. He had a dummy telegraph instrument on which he had taught me telegraphy, and on this particular evening I was working the instrument as usual, when he said:

"You don't press hard enough, Berliner."

"Does that make any difference?"

"Certainly; it makes all the difference in the world in the strength and clearness of the message at the other end. That is why women do not make good and effective operators as a rule. They are not strong enough—their touch is too light. They do not give thorough contact."

"That was a revelation to me. Under Mr. Bell's invention the voice had to vibrate a diaphragm against a magnet, and the volume of electricity thus produced was not sufficient to transmit sound waves sufficiently strong. That night, before I went to sleep, I had set up the movable diaphragm used in the telephone today, which keeps in constant contact, but with varying pressure, with the transmitting end of the telephone wire, simply pressing back and forth as the sound waves produced by the voice diminish or strengthen.

"Another case illustrating this point occurred not so many years afterward. Upon the completion of my invention of the constant contact sound transmitter, the Bell telephone people engaged my services as expert to aid in perfecting the telephone, which was still in a crude state. Mr. Blake had just invented his form of transmitter and the instrument was placed in my hands for final development. It secured a very much clearer transmission than had been possible before, but one of its troubles was that the carbon button used would rapidly wear holes at the contact. The material was so soft that it kept us busy replacing or refacing the carbon buttons. These buttons were made from the ordinary long soft carbons used in arc lights, which had only just appeared in the market. They were made by sawing the long carbons into thin circular buttons. We conducted all sorts of experiments with a view to securing a hardening of this carbon, but for a long time we failed in effecting any improvement. It was well known that the hardest carbon in the world was that which is deposited in gas retorts. This carbon deposit had always proved a serious source of trouble since the manufacture of coal gas was invented, because it has to be cleaned out from time to time, and this is a difficult job.

"It occurred to me to have a little iron cage built, into which I put a lot of our soft carbon buttons. This cage I asked the gas people in Boston to put into their retort on the next occasion when they were ready for a charge. I left it there during six charges; then, when I took it out, I found my carbons all shriveled and shrunken. The intense heat had half burned them up. They were all rough, and for a little while I thought there was another failure. In a contemplative mood I began to rub one of the roughened buttons on a piece of emery paper to see what polishing might do for it. Soon I had rubbed away entirely the spongy rough surface and got down to the original button. Examining this closely, I found to my great surprise that the carbon itself was practically unchanged, except that it had become tremendously hardened. A closer inspection showed that not alone had the carbon in the gas deposited itself on the surface of the buttons, but that it had also penetrated the pores of my carbon, filling them up absolutely and making buttons as hard as any one could desire. That was in the year 1879. By exposing to fewer gas charges we thereafter produced a carbon button that was at once hard and smooth, and to this day this process is employed. Nothing has ever been found that hardens carbon buttons for telephone use better or more economically."

Dr. F. O. Hawley, the city physician of Charlotte, N. C., has recently received a patent on a fumigator, which he says is much simpler and more effective than anything else he has seen for the purpose. The city recently suffered from an outbreak of small-pox, and was compelled to buy a number of fumigators, and nearly all of them were unsatisfactory in some respects, and those which did the work properly were generally very expensive or cumbersome. The device which the doctor has made can be made and sold for about one-third the cost of the average implement of this character, and the doctor says that he has several

times demonstrated that it can do more work than the best of them.

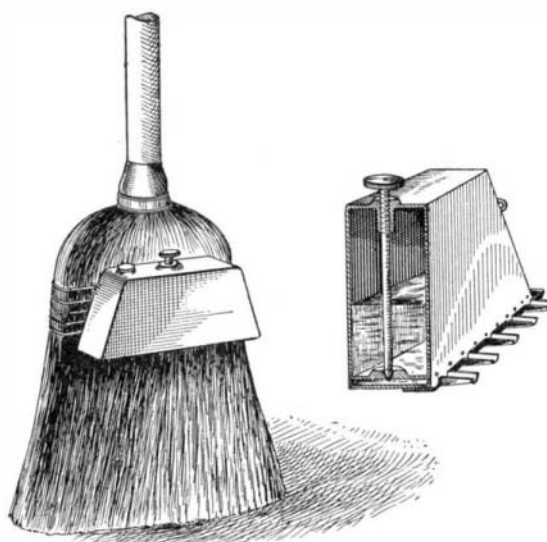
ODDITIES IN INVENTIONS.

EYE SHADE.—Eye shades now commonly in use are clumsy affairs, covering the whole forehead and held in place by spring strips which are adapted to fit tightly against the head. A recent patent provides an improvement on this device, which is illustrated herewith. The improved shade has approximately the form of a pair of spectacles, being held to the head by bows and loops arranged to loop over the

**EYE SHADE.**

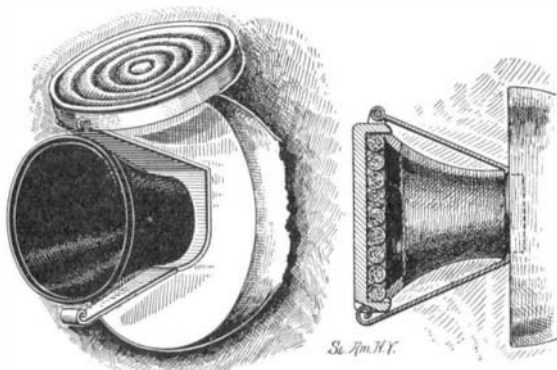
ears, and a nose bridge to prevent the shade from falling down over the face. In place of the lenses small shades are provided, one for each eye. The shades consist of semi-cylindrical portions projecting forward to shield the eyes, and vertical portions adapted to fit closely to the line of the forehead, thus preventing entrance of light at that point. The shades are so arranged as not to interfere with the action of the eyelids.

BROOM ATTACHMENT.—By the use of the broom attachment illustrated herewith, oil may be supplied to a broom in any desired amount for the purpose of oiling floors, etc. The attachment consists of a can provided with a false bottom forming an auxiliary chamber which communicates through a series of perforations with spouts projecting between the straws of the broom when the device is secured in place. The

**BROOM ATTACHMENT.**

oil or other liquid is stored in the can, and may be fed into the auxiliary chamber through a small opening, controlled by a needle valve, whence it passes through the spouts to the broom, and is distributed to the lower ends of the straws on the broom for application to the floor. The series of troughs are connected by a channel, so that in case an opening from which one of the troughs is fed should become clogged, the trough could receive its quota of oil from the common channel. This attachment will be found useful also for moistening the floor with water, to prevent raising the dust when sweeping.

ANTISEPTIC ATTACHMENT FOR TELEPHONE MOUTHPIECES.—The mouthpiece of a telephone, which is in

**ANTISEPTIC ATTACHMENT FOR TELEPHONE MOUTHPIECES.**

constant use by a large number of persons, is apt to become charged with filthy and even contagious accumulations from the breath of the users. To remedy this evil two Californians have devised a simple little attachment designed to deodorize and disinfect the mouthpiece. A small bracket is employed, consisting of a plate with two outwardly-projecting arms. This plate is provided with a central opening adapted to fit over the threaded shank of the mouthpiece, and it is firmly held between a shoulder on the mouthpiece and the receiver proper. Hinged to the upper projecting arm of the bracket is a cap adapted to normally close over the mouthpiece. This cap is provided with any suitable absorbent material, saturated with a sterilizing or antiseptic substance, which will deodorize and disinfect the mouthpiece. The cap is held tightly against the mouthpiece by the lower projecting arm of the bracket, which serves as a spring catch therefor. In use the cap may be easily swung up clear of the mouthpiece, as shown in our illustration.

A Patent's Strange Career.

BY IRVING W. TOWNSEND, EXAMINER, U. S. PATENT OFFICE.

It is a strange and unprecedented occurrence that a patent should have been passed upon by seventeen judges, including the Supreme Court of the United States, and its validity be as open and undetermined a question as it was prior to the bringing of the first suit upon it. It is only by a combination of very unusual circumstances that such a condition of affairs could have arisen. Of these seventeen judges, eight have upheld the patent, eight have found it unpatentable, and one has been upon both sides of the question. Nothing could have been more evenly balanced.

In 1887 Levi Bywater obtained patent No. 374,888, claiming "a knitted fabric, composed of face and back yarns of different materials, the face yarn being looped at regular intervals and on alternate stitches of adjacent rows of the back yarn, and being matted and curly, and having a smooth back, whereby the said fabric has the appearance of looped or Astrakhan cloth, as described." When suit was brought upon this patent, the British patent to Booth of 1881 was set up as an anticipation. Prior to these patents imitation Astrakhan had been produced, but it was always a woven, not a knitted article. The whole question, which has proved so puzzling, is whether the British patent discloses imitation Astrakhan, or whether the change, if any, made by Bywater, involved more than the skill of the artisan. The British patentee claimed to have invented a novel description of looped fabric of ornamental appearance. Just what this means is uncertain. Apparently, he did not claim to knit Astrakhan. Knitters of the present day have, following the direction of the British patent, undoubtedly produced knitted imitation Astrakhan, but the question still remains whether they have not, in so doing, made something that Booth did not have in mind, for the law undoubtedly is that a foreign patent is not to be measured by its possibilities, but by what it substantially displays—what is necessarily inherent in it. Bywater in producing his fabric, uses Mohair yarn, which will both mat and curl, so as to give the shaggy appearance of Astrakhan. Booth used a backing of wool, capable of felting, and for the face a long-fibered yarn, incapable of felting, laid in position in loops. When the fabric was felted the loops projected. If a curly or kinky yarn happened to be used, the loops curled, but the patent does not apparently suggest both matting and curling. Bywater seems to have made a wise choice of yarns, using those that necessarily curl, and by patient work in mechanical development, has provided his fabric. Has he, in so doing, exercised invention?

Judge Dallas, in *Hanifen vs. Godshalk Co.* (78 F. R. 811), sustained the Bywater patent, but upon a rehearing he changed his mind, and held the patent invalid. Upon appeal he was reversed, although by a divided court, Judges Shiras and Acheson holding the patent valid and Judge Butler dissenting (84 F. R. 649). This was in the Third Circuit. The patent was next sued upon in the Second Circuit and was sustained by Judge Townsend (*Hanifen v. Price*, 96 F. R. 435), but he in turn was reversed by the Court of Appeals for that circuit in an opinion rendered by Judge Shipman (102 F. R. 509) and concurred in by the two other judges. Hence, as the patent was invalid in New York and valid in Philadelphia, the United States Supreme Court allowed a writ of certiorari, and it was naturally expected that the matter would thus be put to rest. But it so happened that only eight justices sat when the case was heard and that the Court was equally divided. Such a decision is recognized as an affirmance of the decision appealed from, and as the writ of certiorari happened to have been allowed from the Second Circuit, where the patent was invalid, the decision of the Supreme Court was that the patent was invalid. Had the writ of certiorari been allowed from the Third Circuit, where the patent was valid, there would also have been an affirmance with the result that the patent would have been held valid. It seems clear

that such an affirmation can establish no precedent, although there is little law upon this point.

As the United States Supreme Court had held the patent invalid, infringers naturally sprang up, resulting in a new suit in Philadelphia, where the Court of Appeals had held the patent valid. District Judge Archbald held that the decision of the Court of Appeals for that circuit was binding, thus apparently or nominally reversing the United States Supreme Court, but in view of the anomalous condition of affairs he considered the matter elaborately upon its merits and arrived at the independent conclusion that the patent is valid (*Hanifen v. Armitage*, 117 F. R. 845). Thus the seventeenth Judge has passed upon it. It will next, doubtless, be passed upon by the Court of Appeals for that circuit, and finally come again before the United States Supreme Court, where a full court will give the concluding decision, thus giving the matter quietus after twenty-nine judges have passed upon the patent.

A Few Problems for Inventors.

An Australian correspondent, Mr. Edwin Phillips, puts to us a few inquiries, which may well engage the attention of inventors.

Recently the Melbourne Herald published the following item: "A shunter employed on the Silverton tramway was engaged in shunting when his foot became jammed between the rail and the check rail. Before he could extricate himself the trucks were upon him, mutilating his body terribly. He was killed." Who will devise a cheap and easily-applied device for coupling or uncoupling railway trucks and carriages without the "shunters" or "couplers" having to risk lives and limbs by passing over rails, beneath buffers, and below vehicles?

A port health officer while stepping on board the customs launch at the Port Melbourne railway pier (says a Melbourne daily) to proceed to a French mail steamer, missed his footing and fell into the water between the launch and the pier. Several seconds elapsed before he reappeared. Though willing hands helped him out, yet what was to have prevented his being drowned? Why should not a come-and-go—a give-and-take—gangway be seen? Or some other better combination of elements?

Will wood choppers and timber cutters ever have provided for their use a light, portable, and easily-applied metallic boot shield or attachment? Says the Argus (Victoria): "W. Middleton almost severed his left foot at the instep yesterday when cutting timber at Dr. Butterworth's farm at Dumbalk. During the journey to Meenlyan he fainted several times through loss of blood, and twice he fell off the wagon through the roughness of the road. Each time the wheels passed over him."

"While returning from Traralgon, Mr. G. Dayble, of Morwell" (writes a correspondent of a Melbourne paper), "was thrown out of his gig and received a severe shaking. The horse bolted with the vehicle for about five miles, when it collided with the post of a bridge, smashing the gig to pieces." Which of these accidents was avoidable? The first (the throwing out of the driver) or the second (the bolting of the horse)? Would some hand rail or guard have prevented the first, and a retaining brake the second?

The leaders of four horses of the Bruthen-Bairnsdale coach, while standing outside the post office waiting the mail, shied so vigorously that, the wheels locking, the coach was overturned. The seven inside passengers and one on the box were quickly removed from their dangerous position. What (1) should have prevented the wheels locking? What (2) the overturning of the coach?

Mr. T. Hodby, of Pimpinio, Victoria, was feeding a chaff cutter, when by a unexplained means his left fingers were caught by the cogwheels and drawn into the machine. His hand, after a ten-mile drive, was amputated at the wrist, and a combined fracture of the forearm set. Which was to blame? The machine or the man? Couldn't machines be made which preclude (1) the hands being drawn therein or (2) machines which could be instantly stopped?

What might have ended in the foundering of the ketch "Violet" and the loss of life occurred at Port Campbell. And the question arises what other safeguards, besides periodical inspection and testing, should be adopted in connection with all public cranes. For "when discharging an anchor weighing two tons, the crane pillar broke off and fell onto the deck. One of the seamen just managed to escape."

A ganger's awful death was recently chronicled in the Melbourne papers. It appeared that the unfortunate man was propelling a railway tricycle when the train leaving Eltham overtook him and cut him down. The deceased was approaching the age for retirement from the service, and leaves a large family. Would that family have been left fatherless had some mechanical device been attached to the tricycle in the form of a buffer or fender? Or any other arrangement whereby such terrible consequences could have been avoided?

"Mr. W. Tregise, of Waterloo, met with a severe ac-

cident. While driving home, the bit broke in the mouth of the leading horse. The animals then bolted. To reach the horse's head, Mr. Tregise jumped down, but his legs entangling with the reins, he fell, and was run over. In addition to a deep wound at the back of the knee, his left arm was broken." Fortunately, two passers-by stopped the bleeding. Which was at fault—(1) the bit, (2) the brake, (3) or was it a combination of these? And what is to prevent the recurrence of the same thing unless an emergency brake is introduced, or an emergency horse-releasing device?

In the past, accidents, because they have been accidents, have generally been regarded as unavoidable. But experience teaches differently. Experience shows that accidents may be divided into two classes: (1) preventable, (2) unpreventable. It also shows that a hard-and-fast line can be drawn between those that can be avoided and those that cannot be avoided. Likewise that the list of the preventable accidents is growing every year. In other words, that invention is rapidly increasing the ratio of the preventable accidents as compared with the unpreventable ones. By reform in thought, accidents which were formerly consigned to the second class are now elevated to the first. Who can still further benefit the human race by increasing the preventable accidents at the expense of the unpreventable ones?

Brief Notes Concerning Patents.

G. Foster Howell, the editor of the American Shipbuilder, has invented a form of ship's pump which is operated at a cost of merely the oil used in lubricating the parts. It consists of a normally horizontal lever with a vertical pump rod at each end and a weighted pendulum in the center. The roll of the ship swings the pendulum, and thus drives the pump rods.

According to the Birmingham, Ala., Age-Herald of November 17, Andrew Beard, a colored man of that city, invented a car coupler which he sold to the Janney Company, the amount mentioned being \$100,000. Beard received a payment of five thousand dollars, and with this had some beautiful models of his invention made, and carried them to the office of the company. It is said that he will receive a royalty of fifty cents on every coupler made.

United States Consul W. W. Canada, at Veracruz, Mexico, writes under date of May 16 as follows: "A bill has been laid before the Congress of Mexico providing that trade-marks shall be registered and patents for inventions granted without previous investigations respecting their novelty or originality. Petitions for registrations of trade-marks and applications for patent rights are to receive prompt attention, and measures shall be taken to effect a reduction in the charges made for such service. A special code of penal laws for the prevention of fraudulent uses of trade-marks, etc., and violation of patent rights is to be prepared. The law to be enacted shall be in accordance with the convention of Paris, March 20, 1883, that there may be no impediment to Mexico joining the International Union for the Protection of Industrial Rights."

Up to a very short time ago the glass blower has been the autocrat of the trades, but at present he is, figuratively speaking, at sea. The blower's work has been one of the last to give way to mechanical advance. It is said that the individual earnings of good blowers averaged from \$250 to \$400 per month, and in many places the blowers of an establishment lived in a degree of luxury which compared to that of the employer. The forty factories in this country which are under one control, and which comprise the bulk of those in this country, were all closed simultaneously a few weeks ago, in order to permit the installation of a new machine which the concern has been experimenting with for some time. All the operatives were thus thrown out of work, and there was much speculation as to what the result would be when the factories are opened again. The machine is the invention of John H. Lubbers, of Pittsburgh, Pa., who was once a glass blower, and it is said to be marvelous in its operation and the amount and character of its product. The details of the new mechanical installation have not been allowed to creep out, but it is inferred that the company making this advanced step is fully assured of the success and economies of the new machine glass blower.

Irving E. Burdick, a Yale man who achieved some considerable renown as an inventor by the designing of a very successful electric lamp for submarine purposes, while at college, has recently appeared with another invention of great importance. This one is a system of automatic train control. In order to demonstrate the reliability of his arrangement, he has constructed a very elaborate model, which has been on exhibition in New York, where it has been inspected by a great many of the most prominent railroad men in the country. In case of a broken rail, open switch, open draw, water covering the tracks, or the presence

of a train in the same block, a signal is given in the cab, the steam supply of the engine is cut off and the brakes applied, and the train brought to a gradual stop, these operations being automatically effected. The usual visual signals along the line are rendered entirely unnecessary by this system, but they may be used in connection with this plant as auxiliary signals. The engineer has but to watch the lamps in his cab. There are two used in this connection, one of which is always glowing. One lamp indicates clear track, and the other indicates the presence of danger, and if the engineer fails to notice the danger signal or does not immediately act accordingly, the train is automatically brought to a standstill.

It is almost the invariable experience at conflagrations of any considerable proportions, that the water mains are drawn on to such an extent by the great number of hose connections, that the water pressure becomes considerably impaired. The result of this is that it is impossible to make use of the water which is available, for the reason that the flow is so feeble that it is out of the question to reach the flames. The standard nozzle in use is about an inch and a half in diameter, which is suited for the average pressure, but where the latter is decreased, it is also desirable to decrease the size of the nozzle. To exchange one nozzle for another under the circumstances is not convenient, and in order to meet the demands an adjustable fire hose nozzle has been invented and patented by Harry E. McKechney, a member of the fire department of Rochester, N. Y., which has the advantage that while the hosepipe is in use, the size of the discharge can be varied to a considerable extent. For instance, the size of a one and a half inch opening may be reduced to one five-eighths inch in diameter. The nozzle consists of two parts, a tip and a base, which are fitted together and held loosely by a worm. Inside the nozzle are a number of overlapping staves of thin metal, each one strengthened by a rib of stronger metal. When the full stream of water is to be had, the water pressure will force these staves back against the walls of the nozzle, and the stream will not be interfered with; but when the supply is limited, the size of the discharge is reduced by turning the tip, which by the action of the worm, draws the thimble-like tip down, and thus brings the staff-like sections closer together. This nozzle has been in use for some time in the Rochester department, and has been found to be of great value. It has been also called to the attention of the fire officials of Philadelphia, and a series of trials will be made of it in that city to determine its value. It is expected that these nozzles will be of the greatest service as part of the equipment of office buildings and the like, where the pressure is obtained from tanks.

A decidedly uncanny but most useful invention will be shown in the Liberal Arts Department at the World's Fair. It is a practical device for feeding and delivering paper to and from a platen job printing press. It is a ghostly-appearing device. Two long thin arms of hollow metal, each having five long, crooked fingers, apparently lifelike, ply silently to and fro, feeding the press and removing the printed sheets. By this invention it is possible for one person to operate six job presses at the same time, thus materially reducing the expenses of printing establishments. The inventor of this unique and useful device is Percy F. Rice, a twenty-year-old resident of Tustin, Cal. He began work on its invention eighteen months ago. While watching the movements of a job press in a Los Angeles printing office, one of the employes suggested that he try his inventive genius on a mechanical job-press feeder. Young Rice immediately retired to his workshop, and after nearly two years' hard labor attained success in his new invention. This mechanical feeding and delivering device is a small and comparatively inexpensive attachment for job presses. Its principal parts are the two hollow tubes, with the equipment of fingers so adjusted as to work with the same reaching and retracting movement as the human arm. The finger tips are hollow, and through the functions of a vacuum pump attached at the foot of the press, the paper adheres to the tips the moment they touch it, and is released as soon as the arm retracts and descends on the delivery platform. The whole device is geared directly from the press, and hardly any extra power is necessary to operate it. The arms are removable, and may be laid aside temporarily, so as not to interfere with the placing of the forms. The feeding arm raises a sheet from the pile and places it on the platen as the press opens. It immediately recedes, with a spirit-like motion, to secure another sheet while the press operates, and when the latter opens, the other hand is there, ready to remove the printed sheet and place it neatly on the delivery platform, where guideways are provided to keep the pile in order. This wonderful device is not the dream of a dreamer, but an actual mechanism that will be exhibited in the Liberal Arts Palace at the World's Fair.