

time entertained as to whether she would reach womanhood; but, under the careful tutelage of her wise mother, she has developed into a healthy, lovable girl; and that she has completely won the hearts of her people, you have only to question the average Dutchman concerning her to learn.

As she is approaching the marriageable age, the question naturally arises whom she will select to be Prince Consort. Rumors are abroad to the effect that Wilhelmina is already betrothed to Prince Bernard Henry, a grandson of the Grand Duke of Saxe-Weimar-Eisenbach, who wedded a sister of William III. Should such an alliance take place, it is questionable whether it would be liked by the Dutch people, for they have no very friendly feelings toward the Germans, who, it would seem, are only waiting for a favorable chance to absorb Holland in the German confederation. Germany, however, being the Queen Regent Emma's natal land, she may very naturally wish her daughter to go there for a husband. Still, she undoubtedly has the Dutch people's interest at heart, and can be relied upon to make or sanction no alliance which would be distasteful to them. As for the Queen herself—and surely she, more than anyone else, is concerned in the matter—she says she will have no marriage for diplomacy merely; the man she weds must love her deeply and be loved in return, or she will have none of him. Herein she shows a spirit that an American girl will appreciate. She is said, among other things, to have a will of her own, and an incident illustrative of this, which has been widely told, is as follows: When, some few years ago, the German Emperor was making a formal visit to The Hague, Queen Wilhelmina expressed her intention to attend the state banquet. After considerable argument with her mother on the subject, the latter was forced to conduct the young lady to her bedroom, where, as the Queen Regent was about to leave, she rose upon her dignity and said: "I will go on the balcony and tell the Dutch people how you abuse their Queen." Of course, she did not carry out her threat, and the next morning she was sorry for her rash words; but the incident illustrates her strength of will and a determination not to be abused. Wilhelmina has a gentle though firm disposition, and when she ascends the throne as actual ruler it is to be hoped that she will have as great an influence in the purification of the court after the dissolute reign of her father as did Victoria of England upon the court of that country when she succeeded to the throne.

For the excellent portrait of the young Queen, which we present herewith, we have to thank the photogra-

pher to the Queen, Kameke, whose finely equipped studio at The Hague is visited often by Americans, and who himself has received deserved recognition for the exquisite aquarrelles he produces.

Errors of Instinct.

That instinct is not infallible we are assured by M. A. Aclouque, who gives in *La Nature* (Paris, November 14) some interesting instances of the truth of his assertion. The *Literary Digest* translates part of his article below:

"It may be stated that instinctive impulses are in some degree determined in advance for each species, and in correlation with the different acts that the individual is called upon to accomplish by reason of its own mode of life. Accordingly it is a legitimate conclusion that animals may sometimes be deceived, when the problem that they are called on to solve does not present itself under normal conditions, or when the circumstances in which they are placed are only apparently true. This is in fact what actually happens, and we believe that it will be interesting to cite several examples where instinct, thus confronted—accidentally or experimentally—with unaccustomed or artificial conditions, finds itself at fault.

"The Spegians are a tribe of wasps that make their nests in the earth and provision these nests, where they deposit their eggs, with the larvæ of other insects, particularly caterpillars, . . . or even with spiders. These wasps do not kill their victims; they are satisfied with paralyzing them. For the young larva that will issue from each of the eggs has delicate tastes, and would not be willing to feed on partially decayed flesh. Thus each victim is pierced with the sting, which finds its way to a nerve ganglion . . . and inoculates the prey—to use the technical term—with a drop of poison endowed with anæsthetic properties. This poison condemns the victim to the most absolute immobility, and it thus falls an easy prey to the newly born larva.

"One southern species, the yellow winged SpheX, provisions its nests with a large cricket, which it knows how to wound in the exact spot necessary to prevent all resistance, and which it drags, not without difficulty, to its nest. This SpheX is an interesting study. When it has got its cricket to the edge of its nest, it never fails to go into the gallery, doubtless for fear lest some intruder might profit by its work, and never brings in its prey without going through this prudent domiciliary visitation. If the cricket be removed and placed some distance away, the SpheX, after finding it, brings it anew to the opening, and repeats its inspec-

tion of its lodgings. This happens as often as the observer pleases to repeat the experiment. If now the cricket be taken away altogether, the SpheX at first shows great anxiety, turns around, and rushes here and there, not understanding the trick that has been played it. Finally, recognizing that its efforts are futile, it returns to its burrow and sets to work conscientiously to seal up the opening, as if the cricket were within. In doing thus it performs all the acts imposed on it by its instinct to assure, under normal conditions, the nourishment of its larva. Only instinct, since it did not foresee the case of an accidental intervention that should cause the prey to disappear, did not indicate any solution of the problem thus propounded by chance. And the insect, being confused, does a foolish thing."

Natural and Acquired Immunity.

The natural immunity of many animals to certain diseases, even when the actual virus is injected, has long been known, and various explanations have been given. Quite recently careful investigations have been carried out by MM. Calmette and Delarde in the Pasteur Institute at Lille. In their experiments they made use of the following poisons, viz., an animal virus, serpent's venom, and a vegetable poison, abrine, prepared by macerating jequirity seeds (*Abrus precatorius*) in water. They found that the immunity of pigs and hedgehogs to venom and of fowls and tortoises to abrine could not be due to the presence of antitoxins in the blood previously to inoculation, for the serum of the normal animals had no protective effect on susceptible animals, nor had it any neutralizing effect on the poison when mixed with it outside the body before inoculation, in both these respects differing from serum containing antitoxins. They were also unable to discover any antitoxic substance in the brain, liver, spleen, or other organs of the normal animals. They hold, therefore, that the antitoxic serum is independent of immunity, since that may exist when no antitoxic properties are possessed by the serum. They attribute both kinds of immunity to special characters of the cells of the body.—*Lancet*.

ILLUMINATING values of mantles made from the following oxides per cubic foot of gas: Thoria, commercial, 6'0; thoria, pure, 1'0; zirconia, commercial 3'10; pure, 1'5; ceria, 0'9; yttria, 5'2; lanthania, 6'0; erbia, commercial, 1'70; pure, 0'6; alumina, 0'6. Ceria gives a reddish-yellow light; erbia, zirconia and barium a yellow light; alumina a whitish yellow.

RECENTLY PATENTED INVENTIONS.

Engineering.

SMOKE CONSUMING FURNACE.—Charles Groll, Roubaix, France. This furnace has a rotary grate and a fuel feeder comprising a series of superposed inclined partitions, terminating at different points of the grate, a tube or channel supplying fresh air through nozzles into the combustion chamber. The operation is methodized to get the fresh coal always on coal which is incandescent, to increase the length of the course followed by the gases in the combustion chamber, and conduct them successively from the coolest to the hottest portion of the fuel. The automatic coal feeder consists of a conveying worm and cylinder with apertures which distribute the coal into chutes leading to partitions one above the other in a channel placed radially with respect to the grate.

METALLURGICAL FURNACE.—William J. Thomas, deceased (Hannah Thomas, administratrix), Canal Dover, Ohio. This is a form of furnace adapted for glass melting, steel making, etc. It has two hearths, at the outer sides of which are gas flues and air flues, while there are chills or air spaces below and alongside the hearths, and between them is a main or central gas flue. It is designed in operation that the air and gas in the outer flues shall be reversed about every twenty or thirty minutes, and the gas in the central flue also reversed, along with the draught of the furnace to the stack, the perfect combustion at the top of the central flue carrying the heat through the hearth on either side as reversed.

VALVE GEAR.—Franklin Pilkington, Anniston, Ala. This gear comprises a rocker arm controlled from the governor eccentric, a yoke on the arm being controlled from the shaft eccentric, while a lever fulcrumed in the yoke controls the slide valve and a link connects the lever with the yoke. The improved gear is not liable to get out of order, affords a variable automatic cutoff, according to the speed of the engine, and a constant closing and opening of the exhaust at the proper time to produce highly economical results with but a single valve.

LUBRICATOR.—John C. Bauer, Remsen, Iowa. This is an automatic device for feeding oil to the cylinder or other parts of a locomotive or traction engine, preventing the oil from getting cold and sticky and feeding it in a uniform and reliable manner. The oil receiver is surrounded by a steam jacket, and the feeding of the oil is effected by steam pressure, its passage being regulated in drops by a needle valve oil regulator.

Railway Appliances.

AIR BRAKE HOSE COUPLING.—Ernest W. Shortridge, Kenova, West Va. This coupling comprises two sections, each having a longitudinal duct communicating with a flexible tubing, and the coupling is so arranged that, should a train become accidentally separated, the longitudinal movement of separating the sec-

tions would rotate a valve to prevent the escape of air from the forward section of the train, which would thus be left under the control of the engineer, while the air escaping from the rear section would operate the brakes of the detached section of the train.

RAILWAY SPIKE.—Jens K. Knudsen, Engadine, Mich. The body of this spike has an indentation in one side near the point, and a pliable prong is formed integral with the body and lies normally at its side, the free end of the prong being pointed and curved to lie within the indentation. As the spike is driven the prong diverges from the body portion of the spike and projects through the side of the tie against which it is clinched, rendering it impossible for it to work loose, although it may be readily withdrawn on bending back the clinched point.

Electrical.

DYNAMO AND MOTOR.—Charles P. Turner, New York City. As the magnetic permeability of iron in the field magnet cores of dynamos and motors is affected by the presence of carbon, phosphorus, and other impurities, and the alloying of iron with other metals also causes losses, this invention provides for the combination with the polar extremities of the cast or wrought iron field magnet of a facing of pure iron on the surface adjacent to the armature. The polar extremities are formed with an opening enough larger than the armature to allow for the electrolytic deposit on the concave surfaces adjoining the armature of a coating of pure iron, thus increasing the efficiency of the dynamo or motor.

ANNEALING APPARATUS.—The above inventor has also devised an apparatus for electrically annealing wire, etc., instead of employing an annealing furnace, as heretofore. The invention provides devices for feeding the wire over contact plates connected with an electric current generator, and means for subjecting the wire successively to the action of water, dilute acid, and water, after passing over the contact plates, whereby the wire is cooled, sealed, pickled, and the acid washed from its surface. The contact plates are adjustable to give the desired resistance to the electricity and insure a proper heating of the part of the wire between the plates, according to the strength of the current and the thickness and nature of the wire, which may thus be annealed to a perfectly uniform quality throughout.

ELECTROLYTICAL APPARATUS.—A further patent of Mr. Turner provides for the electrolytical separation of precious metals from the ore without mixing the gangue with the electrolyte, the apparatus being simple and durable in construction. It comprises a tank adapted to contain the electrolyte and provided with an electrode, a transversely partitioned receptacle containing the ore being set in the tank, the receptacle having perforated walls and being made of a non-conducting fabric coated with a conducting substance which is connected with a source of electrical supply to form the other electrode.

COMBINATION BATTERY CELL.—Henry A. C. Anderson, New York City. The zinc cup constituting the positive electrode of the cell is made with a number of apertures, according to this invention, whereby the cell, after its effective term of service as a dry cell has expired, may be revived and used as a wet cell, it being simply necessary to place the cell in a cup or other receptacle containing a solution of sal ammoniac or other exciting liquid, such double use being due solely to the aperturing of the zinc cup.

ELECTRIC SWITCH.—William W. Doty, New York, and James A. MacKnight, Mount Vernon, N. Y. This invention provides a simple, durable and wholly automatic switch for street car and surface roads, which may be readily controlled by the operator in charge of an approaching car to set the switch according to the intended direction of the car. A pair of solenoids is connected with the switch point and adapted to be alternately energized by a current under the control of the operator on the car. The devices are not liable to get out of order, and moisture is not apt to interfere with the proper working of the parts.

TRAIN CONTROLLING DEVICE.—Christopher A. Shea, Milton, Mass. To automatically set the brakes on a train, should there be danger on a portion of the track section ahead of the train, this inventor has devised a novel arrangement of a circuit to be automatically controlled to release certain brake operating devices. The track circuit consists of the two rails connected by resistance coils and a short auxiliary contact rail, while a contact lever is carried by the train, and electric mechanism connected with the air brake valve lever, whereby the brakes are operated by the opening or short circuiting of the train or track circuit.

Mechanical.

RULING MACHINE.—Charles Stoll, Chicago, Ill. This invention provides novel means by which a double ruling attachment may be readily connected with or disconnected from the ordinary mechanism of a single ruling machine, enabling it to do single or double ruling at will. The invention comprises an auxiliary frame with rollers and cords co-operating to secure the reversal of the paper, a ruling device being carried on the frame, and there being pivoted arms by which the auxiliary frame may be raised clear of the main frame, and means by which the roller carrying the back strings may be shifted between the main and the auxiliary frames.

SAWING MACHINE.—Albert C. Calkins, Santa Barbara, Cal. This machine comprises a vertically adjustable frame supported on upright guides, a yoke forming the lower part of the frame and a block sliding in guides being supported in its upper part, while a pendulum rod is pivoted at its upper end to the block and at its lower end to the saw frame. The saw is lowered as the log is being cut, and in all positions the saw has a straight line motion, the saw being operated by a wheel, crank or other power device.

LEATHER WASHING MACHINE.—James McKenzie and Charles O. Shaw, Cheboygan, Mich. In this machine revoluble brushes are located one above the other, the shafts of the brush cylinders being revolved by intermeshing gear wheels, and the leather to be washed is fed between the brushes by feed rolls, the arrangement being such that the leather may be passed in and drawn back from between the brushes, without much strain on the working parts of the machine or much exertion on the part of the operator.

Agricultural.

STOCK WATERING.—Reuben G. Fay, Harlan, Iowa. To facilitate the watering of stock, this inventor has devised a novel connection between the permanent tank or reservoir and the trough, whereby the water in the trough will always be automatically kept at the required level. The invention comprises a valve casing supporting an arm through which the stem of the valve passes, there being a pulley adjacent to the arm and a float connected with the valve stem. The device is simple and inexpensive and may be readily applied to any form of trough or water reservoir, no matter how far they may be separated from each other.

Miscellaneous.

BICYCLE SADDLE.—In a design patent granted to Charles H. Young, M.D., 160 West Forty-eighth Street, New York City, for a bicycle saddle, special features of form are shown. The saddle is anatomical in all its parts, presenting concave surfaces that accurately fit the convexities of the buttocks and perineum, thereby preventing injurious pressure on these parts in both sexes. Whether made of leather or other material, the saddle is sustained in the shape best suited to the curves, upon a spring frame adapted to conform thereto. It should be made in different grades to easily fit persons of all ages, so that the curves are proportionate to the size, rendering the saddle always perfect, easy and comfortable to the rider. Manufacturers and others interested may obtain further particulars by addressing Dr. Young as above.

BICYCLE SUPPORT.—Thomas Jefferson, Spearfish, South Dakota. This is a device adapted to be carried on the frame of the bicycle and readily swung down to engage the ground and hold the wheel erect when the rider dismounts. It comprises a cross bar which centrally engages the frame, and having at its ends casings in which are pivoted arms adapted to be raised and lowered and locked in either position. The device is very light, strong and inexpensive, and forms a most convenient attachment to a wheel.

BICYCLE BRAKE.—Frank J. Coombs, Columbia Falls, Montana. According to this improvement, there is a pedal sleeve on the pedal shaft and cams are carried by the shaft and sleeve, on which a ring-shaped sprocket wheel is loosely mounted, brake shoes being movable into engagement with the wheel by means of cams, while spring impelled dogs carried by the shoes

