their diminutive rattles seem scarcely responsive to the provocation of a gesture or a blow. A large copperhead snake (Agkistrodon contortrix), curiously observant, but motionless, is extended in another case, his faintly rubescent tint and impassive attitude increasing his resemblance to a metallic cast.

Less threatening are the numerous groups and individuals of the non-poisonous species, whose long familiarity with handling have rendered them tame and gentle. They are taken out by Mr. Dittmars and, enwreathed around him, form living festoons of slowly undulating bands marked by party-colored stains, blotches, squares or lines, emitting with lightninglike rapidity their delicate forked tongues.

The beautiful red corn snake of more southern latitudes, the long black chicken snake, the pest of henroosts in the South, the agile and belligerent black snake of our swamps and woods, the exquisitely colored green snake found more to the north, the highly colored hog-nose snake with its inflated neck and mimicry of menace and attack, the many species of garter snake, from those of the Mojave Desert to the lithe and variegated ribbon snakes of our fields and hillsides; the singular milk snake, over whose variations in markings Dr. Cope has exhausted his searching analyses; the vivid pine snake, the fox and water snakes, compose a garland of novelty and interest.

Mr. Boulenger, who has recently completed the catalogue of snakes in the British Museum, a work of extraordinary pains, recognizes 1,639 species, which he divides among nine families. First in this systematic arrangement come the wormlike Typhlopidae living in burrows under the earth, and numerous in the tropics. Allied in habits are the Glauconiidae, and then the huge pythons and boas, with an intermediate section of the Ilysiidae with only five species, two East Indian genera and one South American. The Uropeltidae follow, the whole of whose forty-two species are confined to Ceylon and India, where they are found in the tea and coffee fields. Mr. Boulenger limits the sixth family to one genus and species, Xenopeltis unicolor, of India and Malay. The seventh family is the Colubridae, the most extensive of all, comprising the more common of our snakes. This enormous family has been separated into three parallel series, the first with solid teeth, the second with the hinder teeth on the jaw (maxillary) grooved, and the third with the forward maxillaries grooved. The first comprise (Aglypha) harmless snakes, the second (Opisthoglypha) suspicious, more or less poisonous species, the last (Proteroglypha) venomous groups. The typical poisonous snakes are placed in the Viperidae, the ninth family. Here rest the copperhead, rattlesnake, cobra, fer de lance, etc. The eighth family, Amblycephalidae, have non-extensile jaws and feed on insects. The erectile teeth belong to the true vipers, and it is interesting to observe the fang or tooth of the rattlesnake, disclosed from its membranous sheath, and forced by pressure upon some solid object, exude the deadly liquid so mysteriously fatal. Mr. Dittmars has been engaged with Dr. Langman, of this city, in procuring, from a vigorous and large collection of snakes, belonging to the latter, samples of the venom of water moccasins, rattlesnakes and copperheads. This is furnished to the laboratory at Heidelberg for analysis in continuation or confirmation of the studies of Weir Mitchell and Calmette.

However strong the sense of abhorrence may be awakened in some in the presence of these reptiles, it would, upon familiarity, rapidly disappear, and it would in most cases be succeeded by a real affection for the many graceful and harmless species.

Mr. Dittmars is not alone in his attachment to this neglected section of the zoological series. Prof. G. R. O'Reilly, Mr. Charles H. Higby, Mr. Gustav Von Moser, and Dr. G. Langman, all of this city, also keep collections, and become deeply attached to their ophidian pets, or, in the case of the vipers, find them full of interest.

THE habit of dressing too warmly within doors in the winter season is earnestly deprecated by physicians. The temperature of modern houses and offices is usually about 70 deg., which is summer heat. Yet both sexes select thick flannels and heavy dresses and coats for house wear and then go out into an atmosphere many degrees colder, with little additional protection, especially for the feet. This is a fruitful source of colds.

### Breathe Properly.

Do you know what an "active chest" is? Probably not, answers a writer in the New York Tribune; but your chest ought to be active—that is, lifted up—two-thirds of the time you are awake. Stand up and take a long breath, as long as you can; now you lift your chest; keep your chest up while you go on breathing by movement of the abdomen and the muscles at the side of your waist. A very slight movement is all that is necessary for normal breathing; but now you have let your chest fall! You are so tired you can't hold it up! That shows a very bad, unnatural state of things; the normal human being, whenever he is not relaxed, walks with his chest up; and when he talks with vigor or interest, it is with his chest up; and you can't hold yours up three minutes without fatigue—you can't do it, at all, for five! Do you know that the preservation or achievement of a round, slender waist will be your reward if you will strengthen your muscles and learn to keep your chest up? It will certainly, except as you become hopelessly fat, and even then good breathing will do much to preserve some good outlines in your figure. Proper breathing and the habit of keeping the chest up will keep all the internal organs in their proper place and keep them from spreading the waist in any way that is unsightly, and shows not Greek health, but deficient vitality. The first thing is to get so you can hold the chest up. Walk across the floor three times, holding up your chest (just as you do when you try to fasten a tight skirtband), at the same time breathing deeply from the abdomen. After the three times you are exhausted; rest and try it again; to-morrow you can perhaps do it four; don't tire yourself, but keep at it till you have strengthened the muscles that hold your chest up just as you would strengthen the muscles of your arms, with use. Always practice out-of-doors or with your windows up; there are many good breathing exercises and but few can very well be conveyed in print, but the main thing is very simple; breathe with your chest up, and keep on doing so till you do it naturally, all the time that you are not relaxed in rest.

One good exercise that can be taught is to simply stand and take as long a breath as you can, chest well up, and then hold it as long as you can. This exercise used for a few minutes every day is most beneficial, and physicians recommend it for strengthening and expanding the lungs.

Professor Tyndall said that, as a broad general rule, any air out of doors was better than any air indoors. Breathing exercises are most effective outside the house and generally they are not conspicuous even on a city sidewalk.

QUEEN WILHELMINA OF HOLLAND.

### THE QUEEN OF HOLLAND.

Of the two child monarchs who have been ruling in Europe of late years—the King of Spain and the Queen of Holland—it is of the young queen that the world at large has heard the most. And indeed it is with her that the world has the more sympathy, for she is the last of the House of Orange, a house made famous three hundred years ago through the bold and determined military achievements of its greatest member, William the Silent—the "Father William" of the Dutch people.

It is a rather striking coincidence that now, after three centuries have elapsed, the thrones of Holland and Spain should both be held by children, and that these children should be, too, the lineal descendants of those most bitter enemies, Philip II and William the Silent; the former the would be destroyer of Dutch civil and religious liberty, the latter the founder and maintainer of it. Though he died a martyr to the cause—for the assassin's knife directed by Philip ended his splendid career—William's life and example so inspired the Hollanders that they were able to keep up the fight until, over twenty years later (in 1609), Spain gave up the contest and the United Provinces of the Netherlands were freed from the yoke of ecclesiastical and civil despotism, against which they had fought for thirty-seven years. This struggle was one of the most heroic and hard fought struggles for liberty the world has ever seen. A nation with less persistency than the Dutch could never have won it.

During the centuries since the separation of the United Provinces from Spain, that particular part of the Low Countries known as Holland has passed through many vicissitudes of government. In the first half of the present century the Republic of the Netherlands went to pieces, and the separate kingdoms of Holland and Belgium were formed out of it; so that at the present time Holland is a limited monarchy having two law making houses much like those of the English Parliament.

Wilhelmina Helena Pauline Maria, the young Queen, was born on the 31st of August, 1880; consequently, she will attain her majority and be pronounced ruling sovereign a year from the last day of August next.

King William III, the father of the Queen, spent the best part of his life in wild dissipation, and developed a character altogether unsavory. In 1839 he married Princess Sophia, of Saxony. He was then Prince of Orange, but after a half score of years had passed he became King, and the fortune left him turned his head. He plunged into all sorts of dissipation, and finally alienated himself from his queen, whom he falsely accused of plotting with the Emperor Napoleon to depose him, and set her up as Queen Regent. So bitter became his hatred of his first Queen that, even when she was on her death bed, he refused to see her. Of the two sons whom he had by this marriage, the elder, the Prince of Orange, ruined his health and died after a few years of reckless life in Paris; the second son, Prince Alexander, who was of a gloomy and unsound mind, soon followed his brother to the grave; and left now without an heir, the fast aging King began to look about for another wife, that he might not die childless. He finally determined on the Duchess of Albany, a daughter of the Prince of Waldeck-Pyrmont, for his second queen, but she, unfortunately, did not fancy the decrepit old King for a husband. She was a young woman of twenty-two, and could hardly be blamed. It is said that when Queen Emma heard her sister refuse the King's offer of marriage she said to her, "Helen, I should never refuse to become a queen." The King happened to overhear the remark and was so pleased with the younger sister Emma—a girl of but nineteen—that he addressed his offer of marriage to her, and she, true to her word, did not refuse. So it came about that this lively young maid returned with King William to The Hague and became his beloved queen, nursing him tenderly through the long, painful years that remained to him of life. He lived to see his little daughter reach the age of ten years; and a few years before his death, at a council of the States-General, he obtained the setting aside of the Salic law, which forbade a female heir to succeed to the throne. So, upon her father's death, Wilhelmina became Queen, and her mother, whom she resembles in many respects, was appointed Queen Regent.

The little Queen was of a most delicate constitution during her early years, and grave doubts were at one

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 photographer 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 aquarelles he produces.

### Errors of Instinct.

That instinct is not infallible we are assured by M. A. Acloque, 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 inspection 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 antomatic 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 sections 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 withm 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, phospborus, 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 and 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 revivified 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 mvention comprises a valve casing supporting an arm through which tbe 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