

rounded by the appropriate outline, the creature appears faithfully delineated before him.

From the nature of the lectures it is plain that no report can do them justice. So, without attempting either to present a faithful synopsis or to confine ourselves to following out the speaker's design of showing the unity of plan running through the animal kingdom, we shall endeavor to give our readers a general outline of the lectures, and report some of the many curious facts and observations brought forward by the lecturer.

History is divided into two great sections; the one division records the works of man, the other, concerning which we know too little, is natural history—the history of the works of God. The animal kingdom is properly named a kingdom; all human beings are kings and queens over the lower creatures, power of life and death, by Divine decree being given them over the beasts of the field, the fowl of the air, and the fish of the sea, and therefore it is but right that we should know something of the conditions of our subjects. In taking a general survey of the animal kingdom, the simplest form of life should first engage the attention, then we may rise to the higher forms. Yet the terms high and low, the speaker wished his audience to distinctly understand, simply had reference to the grades of complication in structure, for the very simplest forms are entirely perfect in themselves, the idea of a development of types running through the animal kingdom being a theory which the speaker utterly repudiated. Beginning with the lowest or simplest forms, Mr. Hawkins drew on the blackboard and explained the character of the coral animal, crinoids, and jelly fish.

While describing the sea-anemone the speaker mentioned a fact that would indicate that this polyp is possessed of far more intelligence than is usually accredited to his family. One of the animals kept in confinement was regularly fed by its owner with small pieces of meat, by means of a pair of forceps. On one occasion Mr. Hawkins attempted to give the animal his customary food supply, but the creature refused to recognize his kind attentions, and stubbornly drew in its arms until its owner appeared, when, after the usual flourishing of the forceps had been executed, the creature received and disposed of its food with considerable avidity. Here was plainly an exhibition of remembrance and recognition, faculties not generally believed to belong to this low order of beings.

Passing to the higher division of the articulates, the structure of various orders of this group of the animal kingdom was finely illustrated. The vertebrates were treated in the same manner. Beginning with the fish, the position of the brain was indicated, the nervous and circulatory systems were sketched, the organs of sense placed in the relative position they occupy in the fish, the rib structure and fleshy parts added, and finely the outline drawn, much to the gratification of the audience. Retaining the general structure of the fish, by a slight modification of the feet, the head and tail, an alligator was shown; by a still further modification and erasure, a well formed pig appeared upon the blackboard, which, in turn, was skillfully converted into an ostrich.

The second lecture of the course was devoted to a consideration of the structure and habits of the extensive family of fishes. The speaker reminded his audience that on the previous occasion he had endeavored to put before them the relationship which existed between the four great divisions of vertebrates, beasts, birds, reptiles, and fishes, and to show the wonderful similarity in their structure, showing also the various modifications in form which qualified them for existence in water, air, or on the earth. As a class, fishes are constituted for existence under the water; but in some instances limbs are furnished, by which they are enabled to leave the water, and even to sustain their bodies in air while seeking their prey. Beginning with the egg, the various successive stages of development, and the internal arrangement of the matured fish, were fully illustrated, and the peculiarities of several curious species of the finny tribe described at length. Speaking of the whale, the lecturer described a chamber existing in the upper part of the head, and forming a part of the breathing apparatus of the animal. Acquainted with this fact, new interest is added to the story of Jonah, and the objections on the ground that the throat of the whale being only a few inches in width, the passage of a man's body would be a physical impossibility, is easily explained. There is no necessity for supposing him swallowed, we need only imagine him taking up his abode in this commodious room, where he could well be accommodated for several days. With a head the third of the length of the entire body, the place we suppose the prophet to have been in might well be called the belly, and the story throughout be consistent with natural facts. And this shows the use of a fuller and more accurate knowledge of natural history than is generally attained.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The Sheffield steel works, at Pittsburgh, Pa., are among the largest in this department of manufacture in the country. They run night and day, employ 50 hands, and have a capacity of fifteen tons of steel per day. The works are now building the largest sheet mill in the Union for rolling steel, which will contain the largest chill rolls in the world. This new mill will be used for rolling circular saws from four to six and one-half feet in diameter; plate, slab, and sheet steel.

A correspondent thinks it not a little singular that in view of the number of appalling accidents resulting from the plunging of cars down railway embankments, the idea has not been suggested of providing a third elevated rail running over the center of the track, to be grasped by extra horizontal wheels, and thus effectually prevent the cars from leaving the track, should rail or axle break. The idea, although not new, is an excellent one, but economical considerations always appear of such paramount importance in the eyes of railroad corporations whenever any such life-saving plans are suggested, that we presume there is little prospect of so sensible a device being speedily adopted.

We have before us a statistical table showing the earnings of thirteen lead-

ing railroads of the land, for the past year as compared with the same for the year 1863. These figures indicate that in four years the roads have increased their earnings nearly eighty per cent, a fact of great importance for those political economists who read in these figures gratifying evidences of increasing national wealth and prosperity.

We are in receipt of an interesting description of the largest bolt works in the world, that of Messrs. Lewis, Oliver & Phillips, located at Pittsburgh, Pa. By the aid of machinery invented and perfected by a member of the firm, eighty thousand bolts are manufactured per day, worked up from a daily supply of twenty three tons of iron, and furnishing employment to 364 hands. The rapidity with which the various operations of bolt making are performed is surprising, the iron being driven through a score of machines, fashioned into bolts and nuts, and packed ready for shipment in the short space of three hours.

At Glasgow, Scotland, the Garakirk Railroad passes by means of a tunnel four hundred feet long, under the Moreland Canal, and over the tunnel of the Edinburgh and Glasgow railroad. The two tunnels stand secure, tier over tier. A similar feat was performed by Stephenson, in Derbyshire, England a railroad being carried over a bridge which there spanned the River Amber, and at the same point, under the aqueduct of the Crawford canal. River, bridge, railroad, and canal were thus piled one above the other, four stories high. Such another curious complication in railroad engineering probably does not exist.

The New Haven Clock Company are said to be the largest manufacturers of clocks in the United States. They employ 250 hands, and produce about 150,000 clocks per annum. So perfect is the system now adopted in this business, and the facilities for manufacturing, that an ordinary one-day brass clock can be made at a first cost of less than fifty cents. In regard to the rapidity of work, some of the workmen can take brass in the sheet, press out and level under the drop, then cut the teeth and make all of the wheels for five thousand clocks in one day. There are eight to ten wheels in every clock, and in an eight-day clock more. If the separate parts were not made for almost nothing, the clocks could not be sold so cheap when finished.

The Mexican silver mines, particularly those in the district of San Luis Potosi, seem to be in a very prosperous condition, if we may judge from the report of the State Inspector of Mines for that district. It appears that one mine in the neighborhood of Charcas, worked at an expense of \$170,000, since the first of January, 1862, has yielded silver during that time to the value of \$5,460,000. The Santa Rosa Mining Company is drawing out \$95,000 worth of ore per week. Its works employ 460 hands, at the rate of thirty-seven cents per day, and the expenses amount in the aggregate to about five per cent of the value of the silver taken out.

We were at fault in announcing the passage of the Arcade underground railroad bill in the New York Legislature, the statement being made on the authority of several daily papers, whom we supposed to be well posted on the subject. It now appears that the bill was lost in the Senate, Trinity Church corporation having the credit of killing it. Several engineers in their interest testified that if Broadway was excavated in front of the church, the steeply—275 feet high—would topple to the ground. The Central underground company have now the entire field to themselves.

The New Haven railroad company, after a three months' trial of the English system of taking up and delivering the mail bags without stopping their trains, pronounced the plan an utter failure.

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING MAY 5, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

Table with 2 columns: Fee description and Amount. Includes items like 'On filing each caveat', 'On filing each application for a patent', 'On issuing each original patent', etc.

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

77,433.—DRAFT ATTACHMENT.—M Adsit, Forrest, N. Y. I claim the plates, b, b, sliding in grooves upon the top and bottom of the double tree, b, in front of the band, D, said plates, b, secured together at their ends and centers by the bolts, c, c, which slide in the slots, d, f, of the double tree, all constructed and arranged to operate as herein described for the purpose specified.

77,434.—SPLINT PLANE.—D. E. Aiken and A. A. Aiken, Adrian, Mich. We claim the wedge, C, of the plane provided with a longitudinal groove in its under side, in which is secured one end of the spring, E, whose free end is adjusted to regulate the thickness of the slit to be cut by the screw, G, passing through the wedge, all constructed, arranged, and operating as described for the purpose specified.

77,435.—SHEEP HOLDER.—C. Albert, Harrisville, Ohio. I claim the adjustable standards, E, arms, F, in combination with the socket stays, D, and rollers, C, in the manner as and for the purpose set forth.

77,436.—CUE TRIMMER.—David Aldrich (assignor to Phelan & Colender, New York, N. Y.). I claim, 1st, The hollow band piece and cue holder, with its table or slide holder, b, in combination with a reciprocating carriage, provided with a cutter, substantially as and for the purposes set forth.

2d, The employment, in combination with the hollow cue holder and hand piece, of a reciprocating cutter carriage and the driving lever, D, the whole arranged to operate in the manner and for the purpose substantially as described.

3d, The removable cutter, g, in combination with the cutter carriage and table, b, substantially as and for the purpose described.

77,437.—THIMBLE PULLER.—A. F. Allen, Providence, R. I. I claim the combination of the expansible catches or jaws, E, E, or their equivalent, the expanding wedge, F, the sleeve, M, and the screw mandrel, H, and nut, P, constructed substantially as described for the purpose set forth.

77,438.—CAR SPRING.—Oliver E. Allen, New York City. I claim, 1st, A spool form car or other spring, composed of an India rubber center, surrounded by woolen yarn or other exterior elastic covering, substantially as described.

2d, A car spring, composed of vulcanized rubber, and wound around by woolen yarn or other exterior elastic covering, and placed and used in a metallic case or exterior, substantially as herein described.

77,439.—SAW.—Solomon Anderson, West Burlington, N. Y. I claim the perforations, c, in the saw plate, A, having upper and lower cutting edges, d, e, and used either with or without the cutting edges, f, g, of the holes, b, substantially as and for the purpose set forth.

77,440.—CLOTHES DRYER.—Charles Bange, St. Louis, Mo. I claim the fixed cylinder, D, revolving perforated cylinder, E, uprights, 1, 2, 3, 4, hoops, a, chains, d, d', collar, c, all in combination with the wheels, H, K, p, b, and F, and their respective shafts, when arranged in relation to each other and the framework of the machine, substantially as and for the purpose specified.

77,441.—OPEN RING.—Andrew H. Bixler, Carlisle, Pa. I claim the elliptical parts, A and B, joined by the hinge and pin, C, and the trapezoid extension, D, of the part, A, all constructed and combined in the manner and for the purpose herein set forth.

77,442.—SOAP STAND.—J. D. Blake, Laconia, assignor to himself and J. A. Sanborn, Holderness, N. H. I claim the base plate, A, provided with stationary clips, B, B, movable clip, C, and clamp lugs, m, m, together composing a soap stand, substantially as herein specified.

77,443.—BUTTON.—Ernst Bredt, New York City. Antedated April, 25, 1868. I claim a button shell, formed of stiffened woven or fibrous material pressed up to the required shape between dies, as specified, in combination with a base or shank, substantially as set forth.

77,444.—BASE BURNING STOVE.—Willis S. Bronson, Hartford, Conn. I claim, 1st, The double ventilated top, c, which covers the combustion chamber, b, and forms a support for the magazine or reservoir, d, substantially as and for the purpose described.

2d, In combination with the double ventilated plate, c, and magazine, d, the conducting tubes, f, and double movable damper, and dividing fine plates, g, substantially as and for the purpose described.

3d, The arrangement of the oven, k, directly over and in combination with the double movable damper and dividing plates, g, substantially as and for the purpose described.

4th, The double movable damper and dividing fine plate, g, arranged in and forming the smoke and hot air flues, e, e, substantially as and for the purpose described.

77,445.—FIRE GRATE.—Willis S. Bronson, Hartford, Conn. I claim the hollow stationary hub, b, c, constructed and arranged upon the supporting bar, a, substantially as and for the purpose described.

The grate, f, as constructed, in combination with said supporting bar, a, substantially as and for the purpose described.

77,446.—HARNESS FRAME FOR LOOMS.—Darius C. Brown, Lowell, Mass. I claim the improved harness or heddle frame, as made with elastic connection bars, C, C, substantially as and for the purpose specified.

Also the combination, with the bars, A, B, and brackets, and spring bars supported in such brackets, of the elastic connection bars, C, C, substantially as herein shown and described.

77,447.—DEVICE FOR SOLDERING THE LIDS OF CANS.—Fredrick W. Brown, Philadelphia, Pa. Antedated April 21, 1868. I claim the combination, substantially as described, of the block A, instrument, D, and chain, C, for the purpose specified.

77,448.—STOP VALVE.—Silas H. Brown, Troy, N. Y. I claim in combination with a valve, B, and actuating stem, D, a movable sliding lever brace, C, so attached to and operating with the valve, that when said valve is closed, said lever braces it tight on its seat, and when said valve is open, said lever moves with it, so as to leave an entirely unobstructed passage way within the pipe, in manner substantially as herein described, and for the purpose as set forth.

2d, In combination with said valve, B, its stem, D, and sliding brace lever C, the grooves or shoulders, E, E, of the valve chamber, A, said grooves or shoulders being inclined relatively to the valve seat, H, substantially as and for the purposes described.

Also the combination and arrangement of the valve, B, its stem, D, the sliding, movable brace lever, C, and the grooves or shoulders E, E, when applied in manner substantially as described, and operating for the purposes as set forth.

77,449.—MACHINE FOR SAWING LATH.—Theodore Bruno, Saginaw, Mich. I claim the gage, M, working in the longitudinal slot in front of the guide, L, and resting upon the spring, N, operated by the lever, O, whereby the number of strips to be cut from the board in one operation is regulated, as herein shown and described.

77,450.—DOOR DIRECTORY.—Lewis Burger, Springfield, Ill., assignor to himself and Isaac L. Hamburger, Albany, N. Y. I claim, 1st, A door directory, consisting of a box, with perforated dial plate, A, and of various rollers, aprons, and heads, to indicate time and date of return, and other notes, substantially as herein shown and described, the rollers, aprons, or heads only being adjustable, by means of a suitable key, as described.

2d, The combined cover and slate, G, when the same is arranged on a door indicator, substantially as herein shown and described.

3d, The letter box, H, card holder, I, and pencil holder, J, when arranged in combination with the door indicator, all made and operating substantially as and for the purpose herein shown and described.

77,451.—COMBINED LOW WATER DETECTOR AND SAFETY ALARM.—Daniel Burns, Bay City, Mich. I claim the arrangement of the within described box, G, filled as specified, with the levers, D, I, K, the valve, A, H, the weights, L, and the cross-hatched slide, E, substantially as and for the purpose set forth.

77,452.—RACK FOR BILLIARD CUE.—Victor H. Buschmann, Baltimore, Md. Antedated April 25, 1868. I claim so constructing a billiard cue receptacle, that the weight of the cue, when placed therein, shall close it, and when the cue is withdrawn the receptacle will open, and remain open, for the return of the cue.

77,453.—MACHINE FOR TAPPING AND DRILLING.—George Cahill (assignor to Isaac G. Johnson, J. F. Hunter, and Peter P. Keller) New York, N. Y. I claim, 1st, The combination of the collar, C, friction band, c, forced lever, D, the forked lever, E, or their respective equivalents, all constructed and arranged in the manner and for the purpose specified and set forth.

2d, The system of levers, G, cam, H, and pin, I, when constructed, combined and applied to the forked spindle of a tapping machine, in the manner and for the purpose specified and set forth.

3d, The forked lever, D, movable collar, C, slotted strap, L, the lever arms, K, K, rods, M, M, arms, N, N, shaft, O, disk, F, all constructed and combined, and all applied to and used upon the forked spindle of a tapping machine, in the manner and for the purpose specified and set forth.

4th, The improved tapping machine, consisting of the several parts hereinbefore specified, all constructed and arranged substantially as described.

77,454.—FEED WATER HEATER FOR STEAM GENERATORS.—George Candee, Berlin Heights, Ohio. I claim passing the feed water or air through successive chambers, (heated as described) of a lower to a higher temperature, in the manner and for the purposes herein set forth and described.

77,455.—IMPLEMENT FOR SHARPENING WATCH WOOD.—Charles P. Carter, Poughkeepsie, N. Y. I claim the block, a, knife, b, and section, c, when arranged and combined to operate substantially the same as shown and described.

77,456.—RAILROAD.—John B. Christian, Mount Carroll, and John Gunn, Salem Township, Ill. We claim, 1st, The construction and arrangement of a railroad track, composed of hollow rails, A, A, placed inside of the usual T-rails, substantially as and for the purposes set forth.

2d, The construction and arrangement of railroad cars, having two or more pairs of broad flanged wheels, B, B, substantially as and for the purposes specified.

3d, The lever, H, H, in combination with the spiral springs, O, O, moving in the periphery of a circle, for the purpose substantially as set forth.

77,457.—BEDSTEAD FASTENER.—John C. Cline (assignor to himself and J. Moore Hendricks), Philadelphia, Pa. I claim the device, consisting of the bolt, G, and tenon block, D, in one piece, and screw cap, E, in combination with the rails and parts of a bedstead, for fastening said rails and parts together.

77,458.—GRATE BAR.—Henry Collinson, Boston, assignor to himself and Samuel Vance, South Boston, and Samuel Vance, assignor to James O. Boyle, Boston, Mass. I claim a grate bar, as made, with its air passages extended entirely across it. Also, the arrangement of the transverse passages obliquely in the bar, in manner as specified.

Also, the grate bar, as made, with air passages extending across it, and to increase in width from their upper to their lower parts, as specified.

77,459.—WATER CLOSET.—George Conron, New York City. I claim the valve chamber, E, pipe, D, pan, f, overflow pipe, C, and valve, A, all constructed and operating together substantially as shown and described and for the purpose set forth.

77,460.—CHURN.—A. L. Converse, Springfield, Ill. I claim the outer gear wheels, I, central gear wheels, J, K, beveled gear wheel, L, plates, G, bearings, N, and shaft, M, when arranged to operate upon the hinged rectangular central lid, C, as herein shown and described.

77,461.—POTATO WASHER.—O. H. Cooke, Morrisville, Vt. I claim the combination of the perforated bottom, B, with or without the metal ring around its periphery, with the sharp-edged float, E, crank, D, and wooden cross piece, C, made, arranged and operating substantially as and for the purposes above set forth.

77,462.—CHURN.—Alpheus B. Corby, Binghamton, N. Y. I claim, 1st, The escapement apparatus, consisting of the pallets, a, y, cam, F, shafts, g, G, and guides, m, n, when used for the purposes described.

2d, The arrangement and combination of said escapement apparatus with the spur-wheels, W, W, drum, R, ratchet-wheel, t, pinion, l, weight, T, pendulum, P, and frame, A, B, C, D, substantially as and for the purpose set forth.

77,463.—EXTENSION STEP LADDER.—Lewis B. Covert, New York City. I claim, 1st, A step ladder formed with the two part steps, b, extension pieces, c, and their steps, substantially as specified.

2d, The swinging steps, b, supported by the castings, g, in the manner specified, in combination with extension step ladder as set forth.

3d, The extension legs, l, c, in combination with the extension step ladder, provided with the swinging steps, as and for the purpose set forth.

77,464.—MECHANICAL MOVEMENT.—J. P. Davis, Stiles, Wis. I claim, 1st, The recessed friction pulleys, D, and racks, a, operating substantially as shown and described, and for the purpose specified.

2d, The gear wheels, G, G, E, substantially as shown and described, in combination with the friction pulleys, D, D, as and for the purpose set forth.

3d, The pulley, I, belt, h, and fly wheel, substantially as shown and described, in combination with the recessed friction pulleys, D, and cross head, F, for the purpose of accomplishing the more perfect working of the parts, all as set forth.

4th, The cross head, F, cogs, n, friction racks, a, substantially as shown and described, in combination with the friction pulleys, D, all as and for the purpose set forth.

77,465.—CEMENT WATER PIPE.—Edwin Dayton, Meriden, Conn. I claim, 1st, The short pipe, E, of tapering shape, fitting into the adjoining ends of the pipes, A, B, to form a water tight joint, and coated upon the inner and outer sides equally with cement, substantially as herein shown and described.

2d, The packing ring or band, a, applied to the pipe sections, substantially as and for the purpose described.

77,466.—CHIMNEY CLEANER.—Thomas H. Donohue, Washinton, D. C. I claim, 1st, The combination of the fixed and sliding collars, B, C, and their connecting arms, a, b, with the bars or segments, c, pivoted together and supported on the shaft, A, for operating together, substantially as set forth.