THE CALIFORNIA FLYING FISH AND ITS ENEMIES.

BY C. F. HOLDER.

In the waters about the offshore islands of Southern California, and along the California coast, is found a fish locally known as the tuna and to science as Orcynus. It is remarkable for its vigorous assaults upon other fishes, especially the flying fishes, which constitute its favorite food. The tuna ranges in weight from seventy-five pounds to nine hundred or more pounds, and ranks as the largest of the bony fishes; but the average weight is one hundred and fifty pounds. In appearance the fish resembles a mackerel, being long and finely built, adapted to speed and vigorous motion.

My first experience with the tuna was at Santa Catalina Island, where during the summer months they apparently lie off the north and south ends of the island, coming inshore generally late in the afternoon, and sometimes at night, driving in the flying fishes (Exocœtus californiensis). Standing on a hill, above the little town of Avalon, perhaps six hundred feet above the water, which was without a ripple, I suddenly saw, some distance to the south, a patch of foam, embracing perhaps twenty acres or more. There was not a breath of wind, yet, in some mysterious way, the sea was being worked into foam, a white, silvery mass covering the surface. It was moving gradually up the channel, and knowing that it must be occasioned by a large school of fish, I hurriedly descended to the beach, took a boat and rowed out, and was soon drifting directly in the path of the oncoming foam. The cause now became evident, as large fishes, from four to five feet in length, were seen leaping in every direction. They would rise from the water directly upward, like arrows, six or eight feet, possibly more in some instances, then turn gracefully and drop, head first, into the sea.

In a few minutes I found myself in the center of this piscatorial high and lofty tumbling, and could see that if a tuna of large size should strike my light boat in the downward fall it would pass through it. The fish dashed about within fifteen feet of me, without, apparently, noticing the boat. They were charging a school of flying fishes, which they had driven up the island, and the latter were frequently in the air, passing this way and that, like quail flushed by dogs.

Never was a better opportunity afforded to observe the movements of these, the largest of flying fishes, some of which were eighteen inches in length. All about my boat the water was filled with their forms, many moving slowly and with difficulty—as though completely exhausted. The tunas swam in every direction, wildly excited, and the white caps which I had first noticed were occasioned by their rushes at the flying fishes along the surface. If the flier was not caught it would impel itself into the air by a vigorous screwlike motion of the tail, which gave to the entire body a vibratory motion which in turn was communicated to the pectoral fins, causing them to vibrate with a tremulous motion a few seconds until the fish was clear of the water from a foot to two feet, when the wings or fins, pectoral and ventral—four perfect parachutes—seemed to be locked or set, and the fish went soaring away.

This remarkable method of escape did not always enable the fish to elude the tuna, which followed, like an avenging Nemesis, directly behind the flier. The latter would soar perhaps three or four hundred feet, then beginning to grow weary, its tail would drop, at which the tuna would make a snap at its prey, but by a vigorous, screwlike movement the flying fish again renewed its flight. This I saw repeated in some instances several times, until the flying fish must have covered an eighth of a mile, when it would drop heavily, literally into the jaws of the voracious tuna.

Scores of flying fishes were in the air at one time, passing in every direction. Noting one some distance off coming toward me, I watched to see if it would turn or avoid me. On it came, about three feet above the water, its large black eyes staring, and its four fins fully expanded and held rigid. It did not deviate a foot to the right or left of my boat, but soared over it within a foot or so of my head, to be caught a moment later by the tuna, which must have passed under the boat as the victim went over it.

The extraordinary leaps made by the tunas were occasioned by their attempts to catch the flying fishes in the air. A tuna in search of prey would suddenly notice a flying fish moving along a short distance above the surface, and would rush directly upward, hurling itself out of water like an arrow. They rarely caught their game in this way, but I observed one rush in which the tuna struck the flier with its head and sent it whirling over and over some feet upward, undoubtedly catching it as it fell.

These tunas apparently averaged from one hundred to two hundred pounds, and in their rushes were marvels of power and vigor. Some idea of their strength can be imagined from the fact that a large one hooked on a line fastened behind a sail boat, which was going before the wind, fairly stopped the boat.

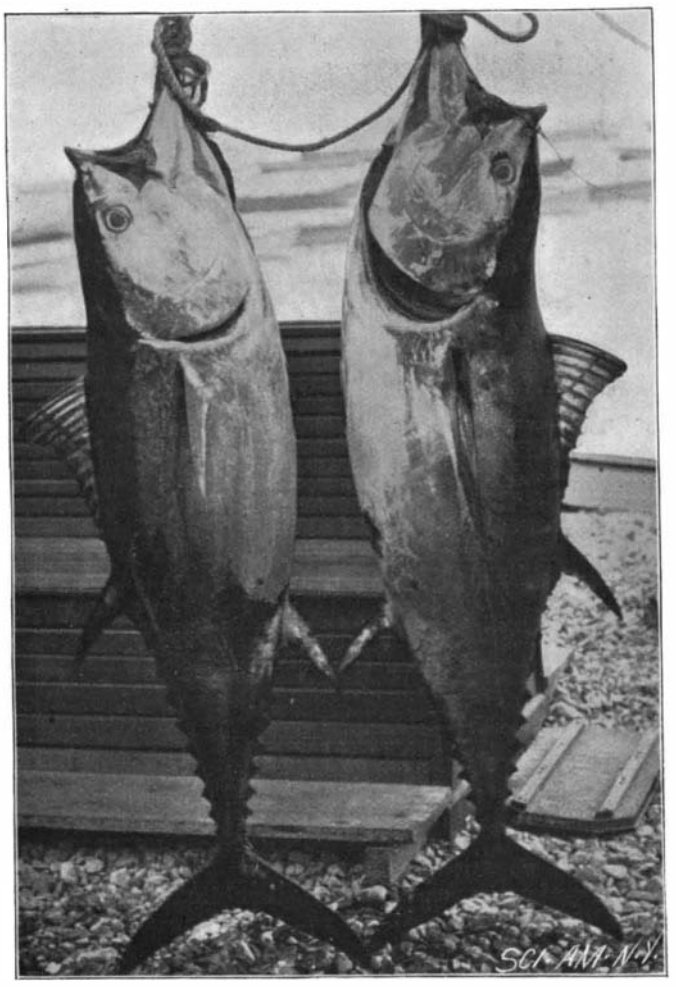
The school in which I was drifting moved slowly up the coast, and continued their depredations as far as the eye could follow them. On another occasion I encountered a school of tunas on the southern end of the same island. A strong wind was coming in from the west which materially aided the flying fish. The latter invariably left the water and soared against the wind, which, as soon as they cleared the water, caught them, raising them in the air like birds, so that they gradually turned away before it with a graceful sweep and dashed along, apparently evading the tunas. The sight of numbers of flying fishes in the air, glistening like giant insects, was a fascinating one, and well illustrated the devices of Nature in protecting her dependents.

On the northern shore of Santa Catalina I have frequently observed the tunas at night dashing into the little bays and forcing the flying fishes in shore, so that often dozens of them would fly out on the beach and into boats.

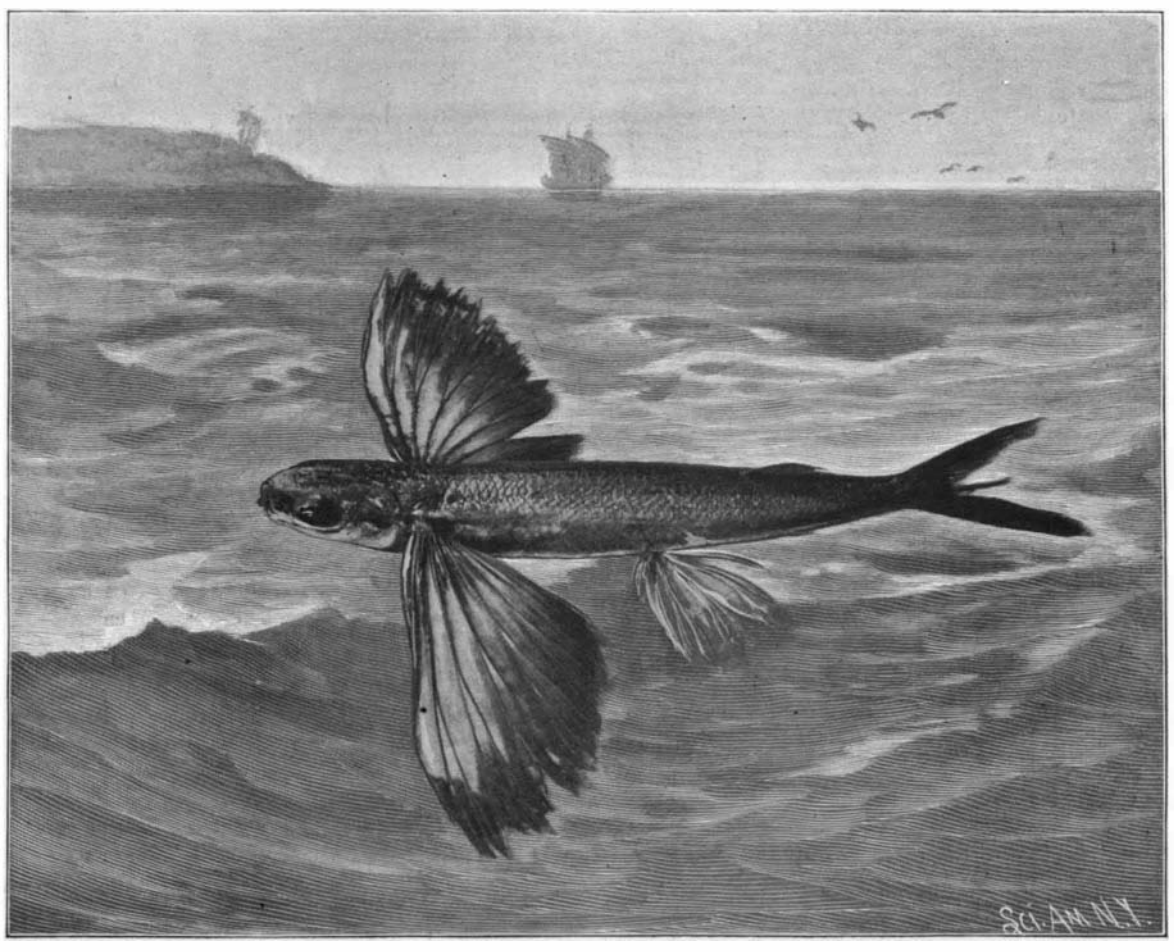
Whether the flying fish has the power to control its movements at such times is an interesting question difficult to decide. In some instances it would appear they have so illustrated this. I have seen a flying fish approach a steamer, soaring two feet above the surface, and when within a few feet of the vessel, dip down and avoid it. But such an instance is very rare. In nine cases out of ten the fish will strike the vessel and drop.

I have had a flying fish cross my boat within two feet of my face, moving on without deviating an inch; and it is not uncommon for the fishermen at Santa Catalina to be struck by these fliers.

As the result of hundreds of observations, I am convinced that the California flying fish does not fly nor move its fins or so-called wings. The fluttering motion is caused by the wriggling of the tail, and when the fish is once in the air its fins are fixed and become parachutes, the action of the fish being identical with that of birds, as the pelican, crow, eagle and condor, which move long distances upheld by the rushing air. In brief, they never beat the fins, but simply use them as parachutes.



THE TUNA (ORCYNUS) OF THE PACIFIC.



THE FLYING FISH (EXOCŒTUS CALIFORNIENSIS) PURSUED BY THE TUNA.

Questions Asked the Smithsonian.

One branch of work done by the Smithsonian Institution, Washington, is very little known, yet it is a very important one from the popular standpoint. This is the answering of questions from all over the United States, on every subject.

Fifty thousand letters are received a year, and none of them are neglected, if it is a question that can be answered. This is the only government which does such a thing.

Prof. Henry inaugurated the system in vogue some forty years ago. He was of the opinion that a well informed man was a much better citizen than an ignorant one, and that it was his duty to impart information whenever requested, whenever such information was obtainable. Of course the questions are of a wonderful variety. For instance, when a New York Sun reporter called at the National Museum recently, he found Prof. Otis T. Mason engaged in finding a suitable name for a country seat for a lady in California. She wanted a name taken from some Indian language. This is only an example of the work done in this line, and sensible questions are always answered, even though they may seem trivial.

The Smithsonian Institution is of great benefit in the distribution of knowledge, its ramifications extending to all corners of the world. Scientists can send the results of their researches to the Smithsonian Institution in bulk, and they forward them to the persons whom they know to be especially interested in the book or pamphlet. This system of international exchange is, of course, extremely beneficial.

A PAPER was read before the Academy of Sciences, on July 5, reporting experiments of the French aeronaut, M. Tatin, at Carquenez. M. Tatin's machine was nearly three times as heavy as Prof. Langley's machine, and had a double instead of a single propeller, and attained a speed of 18 meters (59 feet). The length of the run was 140 meters (460 feet).

Giants and Dwarfs.

Giants and dwarfs, according to a recent suggestive paper read by Hastings Gilford before the Royal Medical and Chirurgical Society, in London, are not only sufferers from diseased conditions, but from the same disease—that known as "acromegaly" or abnormal development of the extremities. Says the Hospital, in commenting on this paper: "Of course every one admits that some men may be large and others small without in any way departing from the normal in regard to the relation of their different parts, and that we may thus have men who are perfect though gigantic in every part, while also we may have dwarfs who are but men on a tiny scale. But it is pointed out that neither all giants nor all dwarfs are built with such symmetry, and that while tiny dwarfs may have big heads and an intelligence quite precocious, giants are very commonly not built on an equally large scale all through. The idea is then suggested that both dwarfism and giganticism are but diverse manifestations of one condition—disease if one likes so to call it—the dominant feature of which is not largeness nor smallness, but lack of proportion between the different parts, taking different forms according to the time of life when it occurs. Under the name of acromegaly, we know of this as a disease which shows itself as an abnormally large development of the extremities, and it is said that many so-called giants are but specimens of this disease, and that some of them are as small in some parts as they are large in others. On the other hand, in certain cases which were described by Mr. Gilford, while the frame as a whole was small, the head was large, as also were certain parts of the skeleton; and the intellectual development, although not perhaps marked by brilliancy, was at least far more advanced than that of other children of the same age. The possibility of such disturbances of proportion being due to some such morbid condition affecting the development as to deserve the name of a disease is all the more interesting from the fact that, although such cases as those related by Mr. Gilford are undoubtedly rare, no one can walk about in that vast pathological museum which the streets of London form to those who have an observant eye, without perceiving that in a slighter degree signs of partial dwarfism or giganticism are by no means of uncommon occurrence among people who, in one way or another, succeed in earning their living in competition with normal man—if there be such an animal."

The British Medical Journal says:

"Mr. Gilford certainly seemed to establish his point that the two cases—the one described by Mr. Jonathan Hutchinson ten years ago and the other observed recently by himself—were examples of a peculiar form of disease characterized by arrest of development and premature senility. He showed grounds for believing that certain dwarfs who have been exhibited from time to time as curiosities were probably examples of this disorder, possibly in a somewhat modified form. His speculations as to the possible relation of the condition to acromegaly raise a question of much pathological interest, but it may be doubted whether the evidence is sufficiently strong to bear the suggestion that all dwarfs belong to the same class. It seems very possible that we have to do with more than one pathological factor."

Mr. W. Crookes on Diamonds.

Before a meeting of the Royal Institute, London, Mr. William Crookes delivered a lecture recently on diamonds. The London Times gave a report of the lecture, from which we extract:

The lecturer began by giving an account of the South African diamond mines, and, after briefly surveying the chief chemical and physical characteristics of the diamond, proceeded to say that speculations as to the probable origin of the diamond had been greatly forwarded by improvements in the means of obtaining high temperatures. Thanks to the success of Prof. Moissan, they could now be manufactured in the laboratory—minutely microscopic, it is true, but with crystalline form and appearance, color, hardness, and action on light the same as the natural gem. The first necessity was to select pure iron and pack it in a carbon crucible with pure charcoal from sugar. Half a pound of this iron was put into the body of the electric furnace, and a powerful arc, absorbing about 100 horse power, formed close above it between carbon poles. The iron rapidly melted and saturated itself with carbon.

After a few minutes' heating to a temperature above 4,000° C., the current was stopped and the dazzling, fiery crucible plunged in cold water until it cooled below a red heat. Iron increased in volume at the moment of passing from the liquid to the solid state; hence the expansion of the inner liquid on solidifying produced an enormous pressure, under stress of which the dissolved carbon separated out in a transparent, dense, crystalline form—in fact, as diamond. To obtain the diamond from the metallic ingot required a long and tedious process of treatment with various strong reagents, and the specimens thus obtained were only microscopic. The largest artificial diamond yet made was less than one millimeter across. Many circumstances pointed to the conclusion that the diamond of the chemist and the diamond of the mine were strangely akin in origin, and the diamond genesis must have taken place at great depths, under high pressure. How the great diamond pipes came into existence was not difficult to understand. After they were pierced they were filled from below, and the diamonds, formed at some epoch too remote to imagine, were thrown out of a mud volcano, together with all kinds of debris eroded from adjacent rocks. According to another theory, the diamond was a direct gift from heaven, conveyed to the earth in meteoric showers, and the so-called volcanic pipes simply holes bored in the earth by the impact of monstrous meteors.

The Sterilization of Water.

A simple method of sterilizing water has been published by Dr. Schumburg, chemist to the German Army Medical Academy, says the Practical Engineer. He finds that the ordinary means of filtration by portable filters is unsatisfactory, but asserts that a solution of bromide destroys the pathogenic germs, and that the subsequent addition of ammonia renders the water palatable. Dr. Schumburg has made a number of experiments with water to which pathogenic germs had been added, and among them one or more in which a liter of water from the Spree was sterilized by the addition of 0·2 gramme of a solution of 20 grammes of bromine and 20 grammes of bromide of potassium in 100 grammes of water. The bromine is removed by a dose of a 9 per cent solution of ammonia. It is possible that some simple mixture may be devised, the addition of which to doubtful water will render it perfectly safe, so far as the pathogenic germs are concerned.

A Simple Fire Extinguisher.

Hand grenades, the simplest form of fire extinguisher, can be made at home cheaply and easily. And it is well to have at hand a simple contrivance for extinguishing a small fire at its start.

Take twenty pounds of common salt and ten pounds of sal ammoniac (nitrate of ammonia, to be had of any druggist), and dissolve in seven gallons of water. Procure quart bottles of thin glass, such as are ordinarily used by druggists, and fill with this, corking tightly and sealing, to prevent evaporation.

In case of fire throw so as to break in or near the flame. If the fire is in such a place as to prevent the bottle from breaking, as in wool or cotton, knock off the neck and scatter the contents.

The breaking of the bottle liberates a certain amount of gas, and the heat of the fire generates more, thus working its own destruction.

RECENTLY PATENTED INVENTIONS.

Railway Appliances.

EXTENSION CAR STEP.—James A. Campbell, Lenox, Mass. According to this invention the stationary steps of the car are held between two rigid side boards, one end of each of which is extended beyond the stationary steps, and pivotally mounted therein is an extension step with two treads connected by a riser, the step being adapted to swing outward into extended position or to lie directly against the adjacent stationary step. The pivoted step has at one end a gear actuated by a gear on the lower end of a rod extended up by the hand rail at the end of the car, and by turning a hand wheel the step may be extended or withdrawn, a catch operated by the foot holding it firmly in either position.

Electrical.

ARC LAMP.—James J. Walsh, Paris, Texas. To regulate the feed of the carbon-carrying rod there are, according to this invention, two escapement devices, one at the side of the other, and the two being alternately acted upon. The escapement wheels are arranged on one shaft, the teeth of one wheel alternating with those of the other, and pendulum-governed escapement dogs alternately coact with the wheels, the dogs swinging independently of each other, and the resistance being exactly equal between each escapement device. By the slow and regular feed possible with this improvement it has been found that the change in voltage is reduced to a minimum, being scarcely perceptible by voltmeter tests, and at any time of feeding not exceeding two volts.

Bicycles, Etc.

BICYCLE SUPPORT.—James Judge, New York City. To support a bicycle in motion while one is learning to ride, this invention provides for attaching to the rear fork supporting rods, each having a roller at its lower end, the upper end of the rod being attached to an arm which is connected with a member of the rear fork by clamping rings. The supports diverge at their lower ends, extending in a line substantially parallel with the fork members, so that the rollers engage the ground at some distance from the wheel, and the connection between the supports and the fork is readily adjustable to adapt the device to different bicycles.

Mechanical.

DRILL.—Herman Richter, Jr., Jersey City, N. J. This drill has been devised especially for overhead work, and the drill shaft is adjustably secured upon a base with a rolling support, the shaft being made in coupled sections, whereby it may be given the length to reach a ceiling of any height. The feed is controlled at the base of the machine, and the driving mechanism may be readily operated by one standing on the floor. The frame in which the drill shaft is sustained may be given any desired angle to drill a hole at an inclination, and a gage is provided for determining the depth the drill enters a piece of work.

WELL OPERATING POWER.—George W. Grimes, Bluffton, Ind. This invention is for a crank and eccentric mechanism for operating oil well drills or actuating oil pump rods, and affords a simple and economical construction designed to have sufficient strength and rigidity to operate several pumps from a central station. Upon the power shaft is a crank arm, with perforations, and an adjustably mounted crank attachment, in connection with rod-actuating plates, there being also on the shaft a crank wheel, with flanges engaged by rod plates or rings.

Miscellaneous.

CARTRIDGE LOADING IMPLEMENT.—Edwin H. Cant, Honolulu, Hawaii. A simple and compact machine has been devised by this inventor by which cartridges may be loaded, primed and crimped quickly and conveniently, and with safety to the operator. The machine also extracts primers from cartridges that have been fired, and in reloading expands the open ends of the cartridges, smoothing out the crimp and rendering the old shells as readily refillable as new shells. A special form of primer extractors is provided for the long primers generally used with high grade smokeless shells.

CARPET CLEANER.—Kelly Girvin, Brooklyn, N. Y. According to this invention a casing with opposite inlet and outlet for the carpet, and yielding supports therefor, is provided also with a rocking beater and exhaust fan, the arrangement being such that a carpet may be readily fed through the machine and beaten without injury to the pile of brussels and other carpets, and without tearing or injuring ingrains. The dust incident to beating and cleaning is also removed from the body of the machine, and from the portion of the carpet being cleaned as rapidly as it is loosened.

CALKING MACHINE.—Joseph D. Maglin, New York City. For properly calking the decks of vessels, floors of slaughter houses, stables, etc., this invention provides a weighted frame with traveling wheels and calking disks which extend below the wheels, a forked handle pivoted to the frame having downwardly extending arms carrying friction rollers, the latter forming a fulcrum for turning the machine around or moving it to different cracks or seams, into which the calking material is pressed by the disks.

LABEL GUMMING, ETC.—William H. Burland, Punta Gorda, Fla. A device designed to be very serviceable to druggists and others has been devised by this inventor for conveniently and rapidly applying an adhesive liquid to a label to be attached to a bottle. The body is preferably of glass and has a longitudinal trough with two beveled side portions and a scraper, and an upwardly projecting nipple communicates with the trough, and the reservoir has a neck wherein the nipple is received.

PAPER FASTENER.—George H. Bennett, New York City. This is a device preferably made of a single piece of wire or sheet metal, formed with a back having its middle portion pliable, so that it may be bent over and carry the corners of the sheets along, and with loops at the sides and a cross bar connecting the loops. The device is inexpensive and may be readily arranged to clip together a variable number of sheets of paper, etc., without perforating them.

ENVELOPE FASTENING DEVICE.—Edward A. Goodchild, Thompson Falls, Montana. According to this invention, the parts of the envelope or package at which the seal is located are made with graduated perforations or openings in the several flaps, that the seal may have a locking action upon the various folds that may be beneath it, thus avoiding the possibility of an inner flap or fold being opened to gain access to the contents of the package while the package is yet sealed and without disturbing the seal.

WRAPPING COTTON SAMPLES.—Claude H. Robinson, Anniston, Ala. A machine has been devised by this inventor with which a number of samples of cotton may be quickly and compactly done up in a roll between suitable wrappers and tied, forming a parcel to be shipped without injury. The machine comprises folding strips hinged at each side of and extending over a table, in combination with tension-controlled boxes in which a shaft is mounted to turn, wherewith a single attendant may in a short time do up and tie a large number of such parcels.

SHAWL STRAP AND LUGGAGE CARRIER.—Edward A. Lefebre, Jr., Brooklyn, N. Y. According to this invention, a roller is mounted within a cylindrical handle, and from the roller a binding strap and also an operating strap extend outward through the handle, the device affording convenient means for binding shawls, books or packages for carrying from place to place. On one end of the roller is a ratchet wheel engaged by a pawl preventing a reverse movement of the roller, the device affording considerable leverage for operating the binding straps.

BOTTLE AND STOPPER.—William J. Hope, Clayton, Miss. The neck of the bottle, according to this invention, has at its outer end a globular seat adapted to receive a ball stopper, the upper end of the mouth being curved to form a shoulder. The stopper is made of a yielding material, preferably as a hollow rubber ball, and may be readily forced within the mouth by a gentle sidewise pressure, but is securely held in position by the pressure from gas or liquid within the bottle.

CLOSURE FOR BOTTLES, JARS, ETC.—Theodore Diebold, New York City. In this device the stopper is formed with a metal head lined on its under side with cork, and the lining is preferably held in place by a disk made of tanned sheepskin or parchment, designed not to be affected by water or acids. The disk is locked in place by a ring on which are eyes which receive the bail carrying the stopper, and by which the latter is locked in place on the jar or other vessel. The stopper is made to be easily and thoroughly cleaned and not leave any taste on the contents of the bottle or jar.

HAME TUG.—William F. Dale, Bowmanville, Canada. This device comprises a chain attached to the hame and inclosed in a leather casing, a number of links passing through links of the chain and through the casing to receive the trace attachment and act as holders for the trace body. The extra links have enlarged shoulders on their inner side bar which engage the edges of the chain links.

REIN HOLDER.—Robert R. Richardson, Portland, Oregon. This is a simple device for attachment to the dashboard, comprising a base plate on which is a yoke open at one side, a hollow cam having a finger piece swinging in the yoke, and a plate spring extending through the cam, the spring being secured at one end to the finger piece and bearing at the other end against the yoke. The spring serves to hold the cam in yielding engagement with the reins.

HORSESHOE PAD.—Michael Hallanan, New York City. This pad is formed of flexible material, preferably of rubber and leather, and has a transverse recess at the inner side of the heel and a rounded portion at its lower side, there being a back plate over the inner side of the pad. The rounded surface forms a rolling support for the horse's foot, and the pad is especially adapted for horses having navicular disease.

OIL LANTERN.—Julius L. Wandler, Brooklyn, N. Y. This is a cheap and strong lamp more especially designed for campaign purposes. The fount has a central wick and filling neck into which fits an apertured stopper held on the under side of the chimney support, a wick tube being secured to the support and extending through the stopper. The chimney is held between springs extending upward from the support, the handle being attached to the springs.

RECEPTACLE FOR VISCOUS SUBSTANCES.—Francis L. Littlefield, Portland, Me. This is a receptacle for mucilage, glue, paste, blacking, etc., which has a valve-controlled outlet in its bottom. The valve projects slightly below the bottom and is pushed upward when the contents are to be withdrawn, the valve being returned to its seat by a spring when the valve opening pressure is removed.

Designs.

TAPE MEASURE.—Ella G. Brewer, Brooklyn, N. Y. This design comprises floral decorations on the graduated side of the tape symbolical of the four seasons—May flowers for spring for the first quarter of a yard, forget-me-nots for the second quarter, golden rod for the third quarter and holly for the fourth quarter.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co. for 10 cents each. Please send name of the patentee, title of invention, and date of this paper.