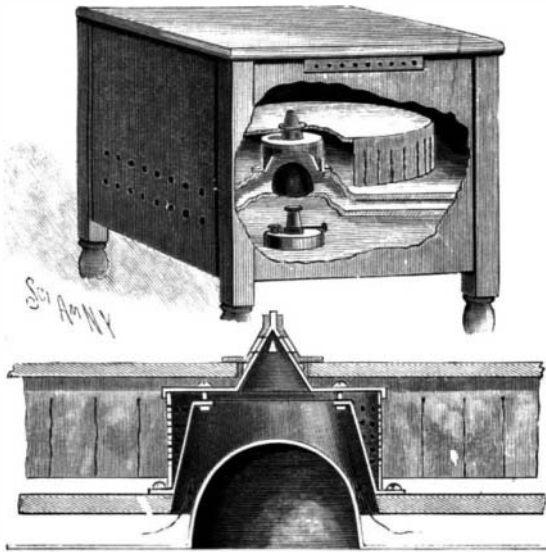


AN IMPROVED CHICKEN-BROODER.

The invention which forms the subject of our engraving is a new chicken-brooder which has been invented by Ernest F. Hodgson, of Dover, Mass., and which provides means whereby the floor of the brooding chamber will not become unduly heated, and whereby the heat passing into the hover-chamber will be under complete control.

Fig. 1 is a perspective view of the brooder, with parts broken away to show the construction. Fig. 2 is a longitudinal section drawn on an enlarged scale.

The chicken brooder comprises a heating-chamber and a brooding chamber placed above the heating-chamber. Within the heating-chamber a ceiling-plate is located, which is provided with a heating-dome pro-



HODGSON'S CHICKEN-BROODER.

jecting into the brooding-chamber. Above the heating-dome and within the brooding-chamber a second dome is secured, which has an open top and which is surrounded by an apertured casing. The second, upper dome is covered by a plate supported from the apertured casing, and provided with a conical projection apertured to permit the ventilation of the brooder. The apertured casing serves to prevent the chicks from coming into contact with the highly heated upper dome; yet the air heated by the two domes may readily pass out through the openings in the casing. Upon the exterior of the conical projection a conical cap is mounted to turn which supports a hover-board, and which is provided with openings registering with the apertures of the conical projection. The hover-board is provided with a downwardly extending marginal apron, forming a hover-chamber.

In the operation of the brooder, cold air is drawn in through vent-holes into the space between the brooding and heating-chambers. The heated air passes up into the upper dome and through the apertured casing to the hover-chamber. If the register at the top of the hover-chamber is open, a portion of the heated air escapes, thus cooling the lower portion of the hover-chamber. By means of this arrangement, a constant current of pure warm air is obtained under the hover-

board, where the chicks are located. By employing a dome instead of a flat plate, the overheating of the brooding-chamber is prevented.

A SIMPLE VEHICLE WHEEL.

A patent has been granted to Olaus L. Grimsrud, of Lead, South Dakota, for a vehicle wheel embodying in its construction a tubular elastic tire which need not be inflated, and a rim of novel form which receives the tire.

The rim of the wheel comprises two rigid sections flaring outwardly to receive the tire, and converging inwardly to form a trough, the bottom of which is formed by a flange on one of the sections, meeting the inner edge of the other section.

The tire consists of an endless strip of rubber, the longitudinal edges of which are inserted between the converging inner portions of the rim sections. An expanding or shaping section formed of a piece of spring metal semicircular in cross section is located within the tire to force it against the outer portions of the rim sections. The spokes of the wheel are secured to the rim by inserting them in the flange forming the bottom of the trough.

The inventor states that the tire need not be inflated, since the elasticity of the material employed and the manner in which the tire is fitted in the rim will cause the tire to remain expanded.

In the double turreted monitors above referred to the adoption of modern guns, in place of the old muzzle loaders, and the installment of machinery for their operation, as well as the appliances for ventilation and electric lighting, began to encroach seriously on the space allotted to officers and crew, and the designers were in a quandary how best to solve the problem, when the present distinguished head of the Construction Bureau, Com. Philip Hichborn, Chief Constructor, U. S. N., took the matter under consideration. He had just returned from a tour of inspection of European dockyards and ship-construction, on which he had been ordered by the Navy Department, and where he had made a special study of turrets, with a view to overcoming the objections to the present type. In order to improve the monitors then under construction, the guns must be raised to a greater height above the water line, and an absolutely water-tight connection



GRIMSUD'S VEHICLE WHEEL.

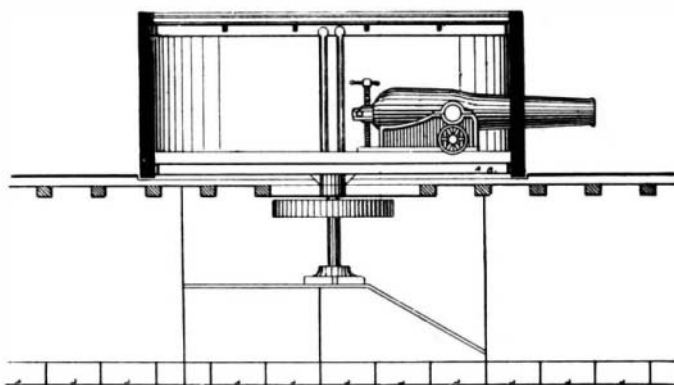
TURRETS OF UNITED STATES NAVAL VESSELS.

The advent of the "Monitor" upon Hampton Bay, that eventful 9th of March, 1862, was the first introduction into actual warfare of the revolving turret for protecting guns of large caliber.

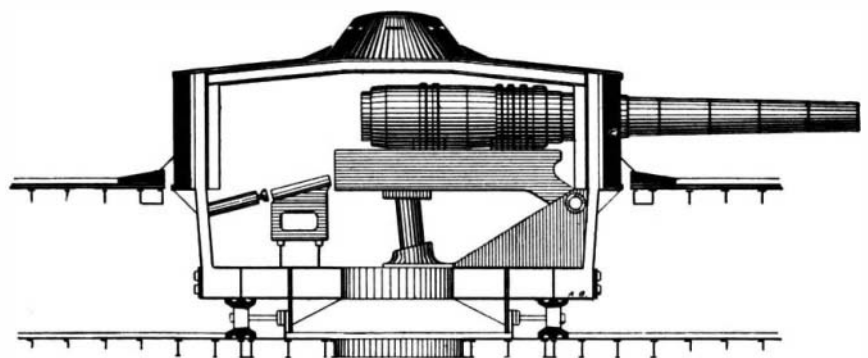
Ericsson's turret, as is well known, was of the cylindrical, or what is facetiously termed the "cheese-box," type. It was practically an inverted box, resting on the ship's deck when out of action, and raised, guns and all, on a central spindle, around which it was made to revolve, whenever it was desired to point the guns on any particular object. The original plans for the double turreted monitors "Miantonomoh," "Terror," "Amphitrite," "Monadnock," and "Puritan," provided for this type of turret; but, notwithstanding its practical success on the first monitor, many serious objections had subsequently been found to this type, and the turrets of the "Miantonomoh" were changed in 1883 to "roller base;" that is to say, the central spindle was abandoned and the whole turret made to rest on a number of rollers running upon a circular rail or track, located on the lower deck. This arrangement required that the turret pass through the main deck of the ship, with a sufficient opening all around for proper working, and in the case of the "Puritan" this annular opening was as great as 24 square feet in area for each turret. The clearance space was covered with a thin, flexible apron, secured to the side of the turret armor and resting loosely on the deck, so as to permit the turret to revolve freely. This apron was liable to be destroyed by either shot or wave, when, with vessels of low freeboard, the ship would be in danger of foundering. With the advent of the modern, high power, long-range gun, the weight of the turret became excessive; the guns were necessarily close to the deck, and in the monitors too low for effective use at long range, and practically useless even in a moderate seaway.

must be made between the lower part of the turret and the deck of the ship. More space must also be provided by adding a superstructure, and this, if possible, without reducing the protection of the guns or increasing the weight of the vessel. These conditions required a radical change in the present turrets, and Com. Hichborn found no difficulty in adapting a general design suited to the requirements. It was found that, on account of the simplicity of construction in this new design, the weight saved on the turrets exceeded that of the proposed superstructure, which was therefore erected without increasing the weight. Raising the guns and adding a superstructure naturally raised the center of gravity of the vessel, and this, in the monitors, has been found to be of great value, making them roll easier and giving more steady platforms for serving the guns.

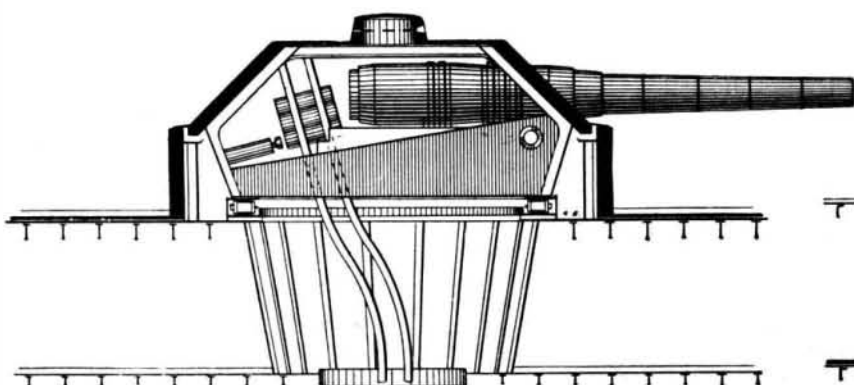
One of the characteristics of the new or "Hichborn" turret, which has been used on all the turreted ships of the navy since its adoption, is that the turret is divided into two parts; a stationary part, fixed to the ship's deck, and forming a circular vertical wall, inclosing the lower portion of the turret proper, and commonly known as the "barbette." It is constructed of steel armor, in some cases more than a foot thick, and extends, in the monitors, some four feet above the deck, forming a water-tight breastwork to that height, and enabling the guns, which are mounted above this, to be fired even when the seas are washing the decks. The upper part, or "turret," rests on rollers within the



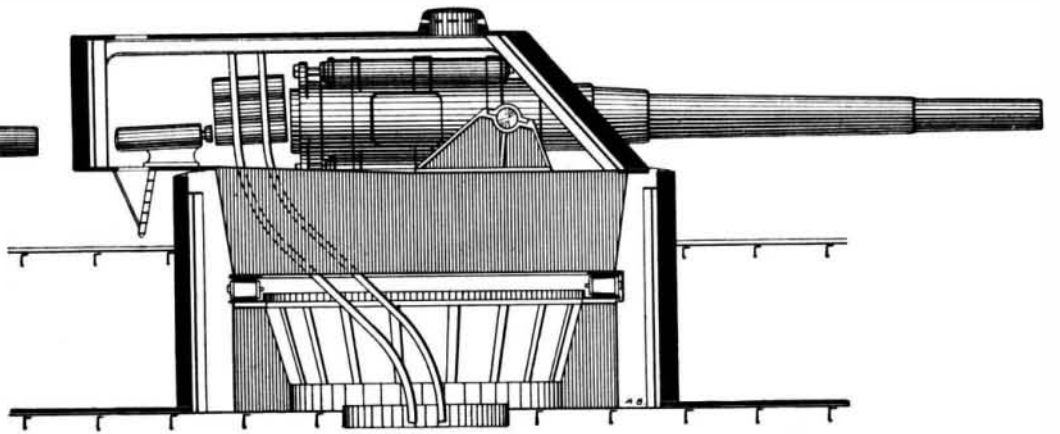
ORIGINAL "ERICSSON" CHEESE-BOX TURRET.



"MIANTONOMOH" TURRET, SHOWING OPENING IN MAIN DECK.



FIRST "HICHBORN" TURRET, WITH SIDES INCLINED.



LATEST "HICHBORN" TURRET, BALANCED, WITH FRONT INCLINED.

Correspondence.

barbette. The portion extending above the "barbette," and through which the guns project, is inclosed in armor of about the same thickness as the "barbette," while the lower portion is constructed of steel framing as light as the conditions permit. The machinery for revolving the turret, the mounts for the guns, and the mechanism for their operation, as well as the machinery for hoisting the powder and shell, and loading them into the guns, are all inclosed within and protected by the "barbette," and are easily accessible for care and operation.

Another characteristic of the "Hichborn" turret is that the sides or walls of the turret proper are inclined toward the center, instead of being vertical, forming a truncated cone above the "barbette." In the first designs, it was intended to make the sides of the turret of a uniform inclination all around; but in later plans it has been decided to make only the front of the turret, or the portion through which the guns project, of inclined armor, on account of the difficulty in manufacturing conical armor plates. The value of inclining the armor is quite evident, particularly with an all-around inclination, as no portion of the armored wall of the turret will then be at right angles to any line of fire that, under ordinary circumstances, may be brought to bear upon it, and a shot striking the armor at an angle will either be deflected, or, if the point penetrates the surface, will, in most cases, break up under the adverse strains. Should it penetrate, it will be compelled to pass through a greater thickness of metal, on account of the inclination, than would be the case if it struck at right angles. Many practical tests have demonstrated the correctness of this deduction. In 1894 the Russian government conducted some experiments on 6-inch armor plates with improved capped shells, of which The London Engineering of July 13 of that year says: "Each of the 6-inch plates was attacked by four of these shells; the first fired normally to the plate, the second at an angle of 15 degrees, the third at 20 degrees, and the fourth at 25 degrees. The first three shots passed through the Brown plate intact, but the fourth, though it passed through the plate, was broken up. With the Cammel plate, the shot striking normally passed through; the one striking at 15 degrees passed through, but was broken up; the one striking at 20 degrees only penetrated 3-3 inches and was pulverized, and practically the same was the case with the fourth shot. Some Holzer shells were also tried. The normally striking shells penetrated the plate, but not the backing, while the oblique ones failed to get through."

These plates were of soft steel, and not comparable to the hardened plates now used in our navy.

In a lecture before the Naval War College, Prof. P. R. Alger, of the U. S. navy, who is considered an authority on such questions, stated that "At even large angles of incidence, armor-piercing shells are broken up by comparatively thin armor." A report of the Bureau of Ordnance also states that "Experimental firing at inclined armor has, at the naval proving grounds, in August, 1893, demonstrated that an 8-inch shell attacking an 8-inch nickel steel plate was wholly deflected when the angle of impact was 45°." This demonstrates fully the value of inclining the armor, and it is unfortunate that an all around inclination, as originally intended, has not been adopted in the later designs.

Yet another characteristic of the "Hichborn" turret is that it should be balanced, that is, the center of all the weights should lie, as near as may be, in the axis around which the turret revolves. This prevents the tendency of the turret to spring when the ship is rolling or pitching, and increases to a large degree the accuracy with which the guns can be trained, as well as relieving the turning machinery and turret framing of the irregular stresses to which they are subject when the turret is unbalanced.

The principle of balancing was first proposed in the original turrets for the "Monterey," as early as 1888. It has since been used for all turrets of the latest battleships in our navy, and has also been adopted on many warships constructed in other countries. A. W. HART.

Shipwrecked Scientists.

Several shipwrecked scientists who sailed from San Francisco early in February on the schooner "Ella Erland" for a cruise in the South Seas have arrived at San Francisco from Guayamas. They were picked up in Magdalena Bay near where their little vessel was wrecked. Prof. A. W. Anthony headed the expedition, whose object was to study the flora and fauna of the Pacific coast near the equator. It is said that they stated that the Mexican customs officers confiscated all that they saved from the wreck of their schooner.

The New Chief of Ordnance.

President McKinley appointed, on April 5, Col. Adelbert R. Buffington to be Brigadier-General and Chief of the Bureau of Ordnance, U. S. army, to succeed the late Daniel W. Flagler. General Buffington has been connected with many important improvements, notably the Buffington-Crozier disappearing gun-carriage and the field gun-carriage now in use in the army.

Fire Protection of Tall Buildings.

To the Editor of the SCIENTIFIC AMERICAN: I notice in your March 25, 1899, issue of the SCIENTIFIC AMERICAN, an article entitled "Fire Protection of Tall Buildings."

An account of the test you speak of was given in The New York Sun of March 13, 1899, and was shown me by a party very much interested in progressive fire protection.

At the time I questioned the ability of Chief Bonner or anybody else to accomplish what it is claimed they did; and I made the statement at the time that if Chief Bonner had not made a report of this test at the time he did, the occurrence of the Windsor Hotel fire would have delayed his making it perhaps at all.

According to this test, the protection of tall buildings, twenty-five and thirty stories high, is assured. I would like to know just what protection is afforded a comparatively low building, say five to seven stories, the greater part of which can be reached with streams from the ground? If they have such adequate protection for tall buildings, how is it they make such a miserable failure of a low and easily reached (so far as water is concerned) building like the Windsor Hotel?

Here is the case of a building well surrounded with streets, low in height, comparatively, burning to the ground in a short two hours, in the day time, in defiance of the whole New York Fire Department, and consuming with itself the bodies of an unknown number of persons and the entire contents within the structure.

On the other hand, you have what is known as a skyscraper, an ordinary fire engine, a six-inch standpipe, and Chief Bonner and a few of his men on the top throwing a stream 250 feet, and the building is declared to be amply protected from fire, with the exception that the couplings of the pipe are liable to burst. There are some things we do not credit, even at the end of the nineteenth century.

THOMAS A. FORSYTH,

Superintendent Boston Belting Company,
Boston, Mass., April 1, 1899.

End-on Fire in Our Battleships.

To the Editor of the SCIENTIFIC AMERICAN:

I beg to call your attention to the paragraph marked in the clipping herewith, and ask you if the same can be said of the recently launched battleships (also the proposed battleships) in the American navy. I notice that the "Alabama" and her class can fire only two 6-inch guns astern and only four of the 6-inch guns ahead, which would be miserably weak if she came end-on a ship like the "Massachusetts." I think this defect can be remedied even yet on the "Alabama" and class by having the four 6-inch guns on the upper deck mounted in pairs as the 8-inch starboard and port guns on the "Brooklyn" are mounted, and by sponsoning out the guns on each end of the central battery on the main deck. This would add four guns to the present available forward or astern battery.

As to the "Kearsarge," I notice that in a chase of a vessel it has no gun available for forward (or astern) fire between the 8-inch and the 6-pounder, and, as the large-caliber guns stand such a small chance of scoring a hit on a moving target, she stands small chance of injuring an enemy either as fast or faster than herself. I suggest that the 5-inch guns on each end of the main central battery be given an increased arc of fire, so as to enable them to be trained to the bow or stern, and thus materially increase her power. As to interference, the reason for a forward train on 5-inch guns would also make forward training of larger guns a necessity.

UNITED STATES.

[The paragraph referred to is an extract from an interview by an American correspondent with Lord Charles Beresford, after the latter's return from his recent visit to this country. He said:

"While in New York I went over the Brooklyn navy yard in company with Admiral Philip. I had a particularly good look at the 'Massachusetts,' one of your principal first-class battleships. I can now understand why the 'Oregon' did such destructive work without being damaged. We have no vessels that combine such heavy batteries fore and aft with such low freeboard and consequent small surface exposure. When bow or stern on to the enemy with two 13-inch and four 8-inch rifles at either end, the same effect is secured as a broadside from an ordinary ship, and yet very little of the vessel is exposed to the enemy's fire." It is generally agreed among our naval men that the ships of the "Oregon" class are somewhat over-gunned. The "Maine" represents a better proportion of guns to displacement. Turrets are more "expensive," that is, they use up more displacement, than casemates, although placing the four 6-inch guns on the upper deck in turrets would greatly increase the end-on fire for a relatively small increase in weight. It is possible to push the end-on principle too far, as the French have done. Modern sea fights will rarely be fought end-on, and a powerful broadside fire will prove to be the most effective.—ED.]

Archæological News and Notes.

A picture by Piero della Francesca, from the Tremoille collection, was purchased a few months ago by the Louvre, at Paris, for \$26,000—an almost unparalleled price for an old master of the grade of Piero.

Some interesting discoveries have recently been made at Delphi. These were bass reliefs which must obviously have decorated the proscenium in similar fashion to the Dionysiac reliefs at the Atheneum theater. They are sculptured in long plaques, each of which is carefully lettered.

All doubts as to the burial place of Louis XVI.'s great Minister of Finance, Turgot, have been removed by the opening of a tomb in the chapel next to the Laënnec Hospital, Paris. His coffin was found, which, together with those of his father and two other members of his family, were in excellent preservation.

A search of the vaults of the Corsini Palace for possible Anarchist arrangements to blow up the Anti-Anarchist Conference, which was to meet in the palace, led to an interesting archæological discovery of a secret passage from the Corsini Palace, beneath the River Tiber, to the precincts of the Farnese Palace.

The recent death of Mr. Sidney Cooper brings forward the question of the longevity of artists. Titian died when he was ninety-nine years old; Michelangelo at eighty-nine; Franz Hals, eighty-six; Hoebbema, eighty-one; Teniers, eighty; Ghirlandajo, seventy-eight; Tiepolo, seventy-seven; Mantegna, seventy-five. There are, of course, many others, so that there can be no doubt that the old masters, at least, were of a long-lived race.

In consequence of a recent report that the Palace of the Doges at Venice had become endangered, owing to the subsidence of the walls adjacent to the Bridge of Sighs and the decay of the timbers supporting the Library of St. Mark, the government ordered the distinguished architect Signor Boito and other architects to examine the condition of the structure and make a report upon the same, with a view to its restoration. The architects declare that the stories of danger are greatly exaggerated, but probably some restorations will be carried out.

The fine crusaders' castle, about twenty miles from Haifa, near Constantinople, was torn down a few months ago to build a stone pier at Haifa for the landing of the German Emperor and Empress. The castle, which was a grand old pile, was erected by the Knights Templars during the Crusaders' reign over Palestine. It was in such a fine state of preservation that up to the time of its destruction many of the rooms were actually occupied. This vandalism is comparable to that which led the builders of the Suez Canal to use for the lining of the Mediterranean entrance of the Suez Canal exquisitely carved stonework brought from the ruins of Famagusta, the old Venetian city.

The remains of a "crannog" have been found on the river Clyde. It is the remains of a dwelling built on piles. It is fairly extensive, with a circumference of 184 feet. The piles are of oak, and show under the mud the distinct marks of such cuttings as a stone ax would make. The cross beams are of fir, birch, and hazel; in the refuse mound the pastoral character of the dwellers was shown, for there were bones of cattle and sheep. Many fire stones were found and also a whetstone. The most important discovery was undoubtedly a wooden canoe, 37 feet long, cut from a single oak tree. The crannog belongs to the neolithic age. The crannog is about a mile east of Dunbarton Castle. It is below high water mark.

The Palazzo dei Trecento, at Treviso, Italy, some fifteen miles from Venice, has just been restored, at a cost to the town and surrounding communes. It dates from 1184, and is Romanesque in style. The palace has suffered much during the present century. A fine external staircase was removed, windows were disfigured, and so much vandalism was perpetrated throughout that the restoration was a costly undertaking. On the south side a fresco representing a winged lion was discovered, and it has also been restored. Within the building is an assembly hall some 30 feet high. This part will shortly be put in the hands of the restorers, and it is anticipated that several rare frescoes will be found when the walls are cleaned.

An interesting discovery was made recently at Hampton Court in the course of the excavations for a drainage pipe. Between the railings of the private gardens the foundations of the old water gate or water gallery built by Henry VIII. have been cut through. The walls or piers are of immense thickness, being no less than 25 feet wide, and they are made of the hardest chalk, faced with stone. The opening through which the state barges passed is clearly discernible. On these massive foundations, which were built in the river, formerly rose a picturesque palace of several stories. It was famous for being the place in which Queen Elizabeth was kept as a prisoner of state by her sister. It was finally demolished by William III., on account of its obstructing the view from the windows of the palace.