the lever, G, is raised to drive the harpoon head, *a*, downward through the cork. The lever, G, has its bearings in a cross piece of the frame, A, and carries a segmental gear wheel, F, that engages a rack on the back of the slide, B. A shaft journaled in this slide carries at its lower end the extracting instrument, *a*, and is provided with a pinion near its upper end that is engaged by a bevel wheel journaled on the slide, B, and carrying an arm that extends laterally and between two stops on its frame, A.

Two bill-pointed levers, *b*, are pivoted in a cross bar, D, and extend upward through guides in the lower portion of the slide, B. The bar, D, slides upon two rods projecting vertically from the bed of the machine, and is supported by spiral springs.

The operation of the machine is as follows: The bottle being in position between the jaws, E, the lever, G, is to be raised to nearly a vertical position, forcing the blade, *a*, into the neck of the bottle, severing the wires which secure the cork, and cutting the cork in two in the center. Just as the blade passes through the cork the end of the lateral arm on the bevel wheel strikes the lower stop on the frame, A, and turns the blade, *a*, one quarter around. The lever, G, is now brought down, elevating the sliding frame and blade, and lifting the cork from the bottle. Before the frame reaches its highest point the end of the lever on the bevel wheel, G, comes against the upper stop, causing the blade to be turned to its original position, and at this time the jaws, E, release the neck of the bottle. The two bill-pointed levers, *b*, divide the cork and expel it in two parts away from the blade by the lateral motion imparted to the levers by the engagement of the curved ends by the guides on the slide, B.

This machine is very simple and rapid in its operation, and should find a large use in hotels, restaurants, and other places where a large number of bottles are opened.

PREPARATION OF TINNED IRON—TIN PLATE.

Pure tin melts at a temperature of 424° Fah., and when iron, thoroughly cleansed from oxide and other impurities, and heated somewhat above this temperature, is plunged into the melted metal and allowed to remain there for a time it receives and retains a coating of the white metal. The chief difficulty in this plating process is to get the surface of the metal properly cleansed. The process of tinning sheet iron as usually conducted will show how this is accomplished. It is briefly as follows: Charcoal iron of the proper thickness is cut into rectangular pieces of the required size—usually from 12¾x9½ to 16¾x12½—and bent U-shaped so as to stand on edge. The plates are then placed in an acid pickle, usually of diluted sulphuric acid, though sometimes hydrochloric acid is preferred. In Pittsburg a hot 10 per cent solution of sulphuric acid is employed, and the pickling operation continued for about twenty minutes. From the pickle the plates are transferred to a closed annealing muffle or oven heated to redness, where they remain for about six hours and scale or free themselves from oxidation, when they are allowed to cool, and are then straightened and cold-rolled between polished steel rollers under great pressure, which imparts smoothness and elasticity. After this the plates are usually again annealed for six or seven hours, at a much lower temperature than before. Then follows a second pickling—in warm dilute sulphuric or muriatic acid—for about ten minutes, and in some cases a slight scouring with sand and hemp. After quickly running through water from the last operation they are plunged into melted tallow (free from salt) or palm oil, and when the moisture has been driven off by the hot grease or oil and the plate itself has become thoroughly heated it is ready for the first dip in the tin.

The series of pots in which the tinning operation is performed are placed together on a low brick furnace called by the workmen the "stow." These pots are usually of cast iron. The first, the *tin pot*, is rectangular in shape, and holds about five hundred pounds of block and grain tin, on which floats about four inches depth of pure tallow to prevent oxidization of the metal. The furnace envelops the sides and bottom of this vessel. Alongside this is the grease pot. The *wash pot*, similar to but smaller than the *tin pot*, which it adjoins, is nearly filled with best grain tin, and is provided with a partition to prevent dross gathering at the point at which the last dip is given to the plates. The next vessel is called the *pan*, and is used for draining the plates; it has a grating at the bottom and no fire under it. The last vessel, the *test pot*, has only about one-quarter inch depth of tin in it.

The operation of tinning the plates is as follows: Each plate is lifted singly from the *grease pot* and stood on edge in the tin pot and allowed to remain immersed in the hot tin for about twenty minutes. (The *tin pot* is always kept nearly full of plates.) When lifted out the plate is allowed to drain for a moment, and is then changed to the first division of the *wash pot* for a few minutes, on leaving which it is brushed with hemp, dipped in the second division of the pot, and allowed to drain for a few minutes in the pan. The thick edge or list is removed by momentarily dipping it (the edge) in the hot tin contained in the *list pot* and jarring the plate. After this the plate is returned to the *grease pot* for a few minutes, from which it is drawn out between rollers which smooth and straighten the plates. They are finally cleaned by rubbing them with shorts or bran and leather, sorted, and boxed—each box of I.C. plate containing 112 pounds or 112 plates, the plates having a gauge of No. 30, and weighing one pound each. I.X. brand weighs 140 pounds to 112 sheets.

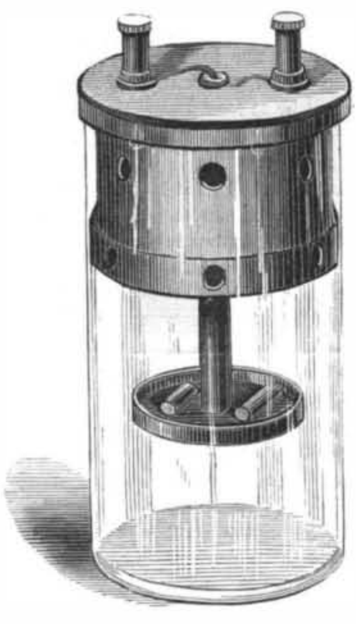
In the trade the grade, weights, and sizes of the plates are indicated by certain marks, as shown in the following table:

Names.	Sizes—Inches.	Number in a box.	Weight in a box—Pounds.	Box Marks.
Common No. 1	13¾x10	225	112	CI.
" No. 2	13¼x 9¼	225	105	CII.
" No. 3	12¾x 9½	225	100	CIII.
Cross No. 1	13¼x10	225	140	XI.
Two Cross No. 1	13¼x10	225	161	XXI.
Three Cross No. 1	13¼x10	225	182	XXXI.
Four Cross No. 1	13¼x10	225	203	XXXXI.
Common Doubles	16¾x12½	100	77	C.D.
Cross Doubles	16¾x12¼	100	126	XD.
Two Cross Doubles	16¾x12¼	100	174	XXD.
Three Cross Doubles	16¾x12¼	100	168	XXXD.
Four Cross Doubles	16¾x12¼	100	189	XXXXD.
Common Small Doubles	15 x11	200	168	C.S.D.
Cross Small Doubles	15 x11	200	189	XSD.
Two Cross Doubles	15 x11	200	210	XXSD.
Three Cross Doubles	15 x11	200	231	XXXSD.
Four Cross Doubles	15 x11	200	252	XXXXSD.
Wasters Common No. 1	13¾x10	225	112	W C.I.
Wasters Cross No. 1	13¾x10	225	140	WXI.

MAICHE'S BATTERY.

The inventor of this entirely original form of battery, of which we give an illustration, has endeavored to fulfill all the conditions necessary to make his battery work for an indefinite period, and this ideal result is obtained—thanks to the means of depolarization which he employs.

A porous vase, pierced with large holes, is fixed to an ebonite cover, which closes an earthenware vase filled with retort carbon, broken in pieces and platinized. The porous vase is traversed by an ebonite tube supporting a small porcelain cup, in which is placed a small quantity of mercury and two small pieces of zinc. A platinum wire, connected to a terminal fixed on the cover, dips into the mercury, and establishes a good contact with the zinc.



MAICHE'S BATTERY

Another platinum wire connects a second terminal with the carbon fragments placed in the porous vase. The contacts are thus completely assured. The zinc is not attacked, except when the circuit of the battery is closed; it is plunged entirely in the liquid, consequently it is entirely used up without any loss.

Under the influence of the platinized carbon the hydrogen of the water, which tends to polarize the carbon, combines with the oxygen of the air. That this novel effect, sought for in vain for a long time, can take place, the carbon should only be partially immersed in the water; the rest becomes wetted by capillary action, and presents a considerable surface to the air.

The water produced by the combination of the hydrogen and the oxygen contributes, to a certain degree, to replace that which passes off by evaporation, and which the cover keeps from being lost.

The electromotive force of this battery is about 1·250 volts; but it is necessary to work it through an external resistance of about 3 kilometers of ordinary telegraph wire in order that it may work well. The exciting liquid may be water saturated with sal-ammoniac, or acidulated by sulphuric acid, or the bisulphate of soda, in the proportion of 10 to 1.

An element working a bell about 100 times a day would not require to be looked after for a very long time, and, in this case, it would only be the zinc that would require replacing, as the platinized carbon preserves indefinitely its catalytic properties.

The Maiche battery is particularly well adapted for electric bells. Maintenance not being required, its fitness and the care taken in its whole construction make it the most perfect bit of apparatus of its kind.—*L'Electricité.*

American Philological Society.

The thirteenth annual meeting of the American Philological Society began in Cleveland, Ohio, July 12, with about thirty members in attendance. The papers and discussions of the first day embraced "Homer and Strabo," by Prof. Egribler, of Johns Hopkins University; "Latin Words in the Talmud," by Prof. James S. Blackwell, of the University of Missouri; and "The Home of the Original Semitic People," by Prof. Loy, of Howard University. In the evening the annual address was delivered by Prof. Lewis R. Packard, President of Yale College.

On the second day papers were read as follows:

"History of the 'A' vowel, from old Germanic to Modern English," by Dr. W. Weelsey, of the Johns Hopkins University, Baltimore; "Verses of Text respecting the Precious Stones of Scripture," by Prof. Blackwell, of the University of Missouri; "Mixture in Language," by Prof. W. D. Whitney, of Yale College; "Language of the Isle of Man," by Mr. W. S. Kerruish, of Cleveland; "The Use of Abstract Verbal Nouns in Thucydides," by Dr. E. G. Sihler, of New York; "The Vowel Scheme of Melville Bell," by Prof. Samuel Porter, of the National Deaf Mute College, Washington.

The Patent Laws.

We are asked by a Pawnee City, Neb., correspondent if we are not mistaken. when we say that the owner of a patent can collect a royalty of an innocent purchaser. Certainly not; that is one great defect in our patent laws, and one which calls most loudly for a remedy. A farmer goes to the village or city, and among the score or hundreds of stores he sees hundreds or thousands of manufactured articles, and it is utterly impossible for him to know whether they are patented or not, unless they are marked, and it is perfectly unreasonable to expect him to know. Amidst this ocean of implements and tools he sees something that he needs, and innocently purchases it, paying for it all that it is worth, and probably all the patentee would ask for it, if it were purchased of him; but the article being unmarked, he is not informed that it is patented, and if it were marked, the patent mark might be forged. He takes home his purchase, and after awhile the patentee discovers the article in his possession, and compels him to pay a royalty. The principle has been carried out in connection with the drive well swindle. Nobody supposed that there was any patent upon drive wells, but one turned up at last, and the man who had a drive well upon his premises was called upon for a royalty.

There is no shadow of justice in such a law. Nobody has a right to ask of the law immunity from all liability of loss, and in the vast majority of cases the seller of a patented article is sufficiently responsible to save the patentee harmless. As the law now stands, it is dangerous for a farmer to purchase anything unless he knows all about the patent, when it was granted, to whom it was granted, who owns it at the present time, and by what authority the seller presumes to sell it. All this is unreasonable, and every unprejudiced person in all the world must unite in that conclusion. The courts are open for a patentee to obtain an injunction against parties wrongfully selling his patent, and furnish him all the means of protection which the owners of other property have. Let him, therefore, resort to those means, and keep his hands off the farmer, whom the patent man seems to especially select for the purposes of oppression.
—*The Western Rural.*

The Laws of Property.

We are asked by an Erehwon correspondent if we are not mistaken when we say that the owner of a horse or a farm can retake his property from an innocent purchaser (the seller having no legal right to sell), or compel the buyer to pay a second time.

Certainly we are not mistaken. That is one great defect of our property laws which thieves and swindlers complain of most loudly.

A city mechanic wants to live in the country, and out of the scores and hundreds of houses and farms and animals there, the history of which he cannot be expected to know, he selects something which he wants, and pays a fair price for it to the man who offers it for sale. When he takes possession the real owner turns up and dispossesses him, or makes him pay a second time. In this way hundreds of innocent mechanics have been swindled in the purchase of farms and horses and cattle and such things.

There is no shadow of justice in such a law. Nobody has a right to ask of the law immunity from all liability to loss, and in the vast majority of cases, the farmer whose property has been sold without his consent should find the seller sufficiently responsible to save himself from loss. It is cruel in him to dispossess the innocent mechanic, who has already paid a fair price for what he has bought.

As the law now stands, it is dangerous for a mechanic to purchase a horse or a house unless he knows all about the owner of it, by what authority the seller offers it for sale, and has a lawyer make a search of the title deeds and all that.

All this is unreasonable, as every unprejudiced land-sharp and horse thief will agree. The courts are open for a farmer to obtain an injunction against parties wrongfully selling his horse or his house or his farm; and he has in that all the protection he can reasonably ask for. Let him therefore resort to those means and keep his hands off the innocent mechanic, whom land-sharps and horse thieves would be glad to prey upon if they found him foolish enough to "go it blind" in his purchases.—*Scientific American.*

Improved Transportation of Fresh Fruit.

A recent shipment of fresh fruit from California to Philadelphia introduces a very promising improvement in the transportation of such perishable commodities. The car contained grapes, plums, peaches, and apricots packed in carbonized wheat bran; an inexpensive packing, which is claimed to preserve fresh fruit for long periods, making possible their transportation across the continent as "slow freight," at a saving of $600 a car load in freight charges.

Correspondence.

Flat Cast Iron Boiler Heads.

To the Editor of the Scientific American :

In your issue, dated July 2, is an article headed "Boiler Explosion Notes," referring to the explosion at Messrs. Gaffney & Co.'s works, Philadelphia, in which you indicate that "the jury rendered an erroneous verdict, and did not avail themselves of the means at their hands to verify practically the correctness of their conclusions."

The treachery of flat cast iron boiler heads has been practically proven and verified by the numerous explosions they have caused, and the trouble has been that in many cases the true cause of the explosion has not been traced to the flat boiler head, but other reasons given, such as low water, overpressure, etc. After having noticed many such cases in the year 1865, I published in Philadelphia papers and also in my Pocket Book the principal causes of steam boiler explosions, of which one was as follows:

"5th. It is a very bad practice to make boiler heads of cast iron, composed of a flat disk of from two to three inches thick, with a flange of from one to two inches thick, with cast rivet holes. The first shrinkage in the cooling of such a plate causes a great strain, which is increased by riveting the boiler to it. Any sudden change of temperature, therefore, either in starting or putting out the fire, might crack the plate and thus occasion an explosion. Such accident may be avoided by making the cast iron head concave and of even thickness."

The same has been published in my "Treatise on Steam Engineering." These books are well known by the Hartford Boiler Insurance Company, which, moreover, ought to have more experience than I have in the treachery of flat cast iron heads. You say: "The jury had the opportunity of submitting the remaining boilers to a thorough test, and of determining on the spot, in the most convincing manner, whether the inspectors whom they complain of had really been remiss in their duty, and whether the jury's notion that flat cast iron heads are unsafe was really correct."

Such an experiment would have been of no practical use, for the jury would probably have found that the shell of the boiler bursted without injuring the head. The exploded boiler was submitted to hydrostatic pressure by the boiler inspector, who found it strong enough for that purpose, and if he had put on sufficient pressure the shell would probably have bursted first. It is not the pressure alone in the boiler which causes the head to burst, but principally the strain in the iron caused by change of temperature.

It is true, as you say, that "flat cast iron boiler heads are used on hundreds of boilers in all parts of the country, and many years' trial has proved them to be safe and serviceable." A flat cast iron head may be much stronger than a concave wrought iron head, but the mischief is that we have no means of knowing when it is good or bad, for its internal condition cannot be seen from the outside; it may be full of air holes and overstrained by shrinkage, so as to make it burst before it is put into the boiler, of which there have been examples.

The most eminent engineer in Philadelphia defends and approves cast iron heads, and he has a theory to anneal them, as is done with carwheels, which would no doubt remove most of the shrinkage strain, but it would not remove the airholes, nor would it equalize the uneven temperature which the boiler head is subjected to. The strain on a car wheel is of an entirely different nature from that of a boiler head, and if his theory is adopted, there will be more "practical experience" in steam boiler explosions.

In one case, a boiler with flat cast iron heads exploded after the fire had been drawn out and the steam pressure reduced far below its normal working pressure, which explosion killed, if I remember right, six men.

With the above considerations, Mr. Editor, I am convinced that the verdict of the jury was a just one, and the wholesome effect it produced is realized by the fact that the Hartford Boiler Insurance Company has now ordered their boiler inspectors in Philadelphia not to insure boilers with flat cast iron heads over 30 inches in diameter. After the company gets more "practical experience" in boiler explosions with flat cast iron heads I hope they will reduce that diameter to 15 inches. In old times, flat cast iron boiler heads were made of charcoal iron, which is much stronger and less liable to strain by shrinkage than is anthracite iron Charcoal iron also flows more solid in castings and has less air holes than anthracite iron. You say in the article above referred to that "from all the information we can gather it seems pretty certain that the explosion was due to an overpressure of steam," etc.

I assure you, Mr. Editor, that the informations published in the papers about this explosion are in the main unreliable. The safety valves were in good order and did not blow off steam before the explosion, and it was testified in the coroner's inquest that the steam was far below its normal pressure shortly before the explosion. The boiler head evidently burst by shrinkage or expansion strain in the casting.

JOHN W. NYSTROM.

1010 Spruce street, Philadelphia.

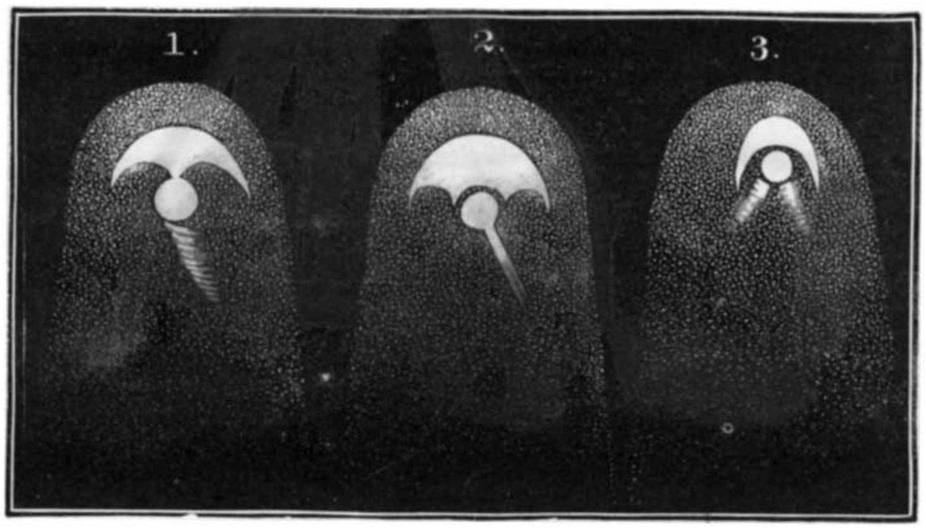
Telescopic Views of the Great Comet of 1881.

To the Editor of the Scientific American :

The accompanying sketches are telescopic views of the comet now adorning our northern heavens. Only the head of the comet is here represented, showing the appearance of the nucleus and coma, and the changes which were observed on the dates mentioned.

Fig. 1. shows the head of the comet as seen on the evening of the 24th ult. The nucleus was round, bright, and of an intense ruddy hue, to the naked eye appearing as bright as Mars. In front of this was a rather slender crescent, less bright, apparently connected to the nucleus, as shown in the sketch.

Fig. 2 shows its appearance on June 26. The nucleus was less bright than on the last observation, with a peculiar flame-like appendage issuing therefrom in a direction opposite from the sun. The crescent had taken the form shown in the engraving.



On July 1 the comet had taken the form shown in Fig. 3. The crescent form was much contracted, was not concentric with the coma as on former occasions, and two faint rays were seen to issue from the nucleus. These changes show great activity, and will doubtless continue, although not in so marked a manner, for some time to come.

WILLIAM R. BROOKS.

Red House Observatory, Phelps, N. Y., July 11, 1881.

Early Observations of Comet 2, 1881.

To the Editor of the Scientific American :

Who first, in this country, saw the great comet now gracing our northern heavens is a question of interest. From recent observations, in verification of a belief expressed at the time of the comet's announcement, it seems conclusive that very early *telescopic* observations were obtained of the northern end of the comet's tail at my observatory, namely, on the mornings of June 18 and 19 at 2 o'clock.

On the above dates I was sweeping for new comets—as has been my custom upon every favorable night for several years—when at about 2 o'clock I pointed my telescope close down to the horizon for a sweep through the northeastern sky, when, at a point between Capella and Beta Aurigæ, I encountered a misty beam of light. I at first supposed it to be a branch of the Milky Way, but although there were many telescopic stars in the field there was a continuity about the light which attracted my attention. It was brighter on the 19th than the morning previous, which I attributed at the time to a clearer atmosphere, not then suspecting its true character. I am now strongly convinced that it was the northern or upper end of the comet's tail, seen some days before the head had risen far enough to become visible in this country. Its position was about R. A. 5 hours 25 minutes, north declination 55°. The comet's position at announcement, on June 23, would agree very well with this place at the dates mentioned, namely, the 18th and 19th inst.

My verification of this opinion has been delayed by an unfavorable sky—a low bank of misty clouds completely hiding for many days the region of Auriga. But on the morning of July 4, also on the morning of the 7th, the opportunity for which I had been watching came. A clear sky in the vicinity of Capella permitted a careful search, when the beam of light previously seen had *entirely disappeared.*

I have waited for a third observation, but the moon at present interferes. Fortunately the *absence* of this beam of light from the place named can be verified by an examination at any future time; and its absence must, I think, convince every candid mind that a telescopic view was obtained by me of the comet's tail as early as the mornings of June 18 and 19.

Dense misty clouds, which soon gathered in the northeastern morning sky, prevented me from detecting its true nature at that time, and seeing more or less of the entire comet rise.

WILLIAM R. BROOKS.

Red House Observatory,
Phelps, N. Y., July 13, 1881.

The Florida Drainage Scheme.

Mention has already been made of the gigantic scheme for the drainage of the Florida Everglades undertaken by certain Philadelphia capitalists. According to a report by the engineer of the company, the country to be opened to cultivation covers over 17,000 square miles, lying about and to the south of Lake Okeechobee. The land reclaimed will embrace every class of Florida land, including "high and low hammock," "first, second, and third rate pine," and "swamp lands," and under the terms of the contract between the company and the State of Florida one-half of the 8,000,000 acres to be reclaimed by the lowering of the lake waters will revert to the company. Valuable deposits of hematite ore and marl are also reported.

Lake Okeechobee is described as the grand inland reservoir for the waters of middle Florida, having no natural or direct outlet. The principal feeder to it is the Kissimmee River, which pours in a constant supply of 207,360,000 cubic feet of water every twenty-four hours. The amount of evaporation from water surfaces exposed to sun and wind is set down in the books at the rate of from one-eighth to three-eighths of an inch per day, according to conditions. Lake Okeechobee having an area of 1,000 square miles, the evaporation from the surface of the lake aggregates at the lowest rate 290,400,000 cubic feet of water, which is more than one-third in excess of the supply from the main feeder. During the ordinary seasons, and particularly during periods of drought, the level of the water in the lake is lowered, the surrounding land becomes in a measure passable, and large herds of cattle obtain excellent pasturage in the savannas and swamp lands of the interior. Then when the rainy season comes, four months in the year, the waters of the lake gradually rise, overflow the immense tracts of sugar land, the soil of which is identical to that of Cuba, and back up the waters of the rivers emptying into the lake.

It is the purpose of the company just formed to permanently lower the surface of Lake Okeechobee, which, according to the United States survey of 1879, is twenty-five feet above mean low tide, by constructing a drainage canal twenty-one miles in length to the St. Lucie River at a waterfall of one foot a mile. This plan is similar to that recommended by Colonel Meigs to the National Government in 1879. In the proposed canal this waterfall will give a velocity of two and two-thirds miles per hour and a capacity of passing 733,708,800 cubic feet in twenty-four hours.

Three steam dredging machines of the Menge patent, constructed on the continuous ladder principle and resembling the buckets in a grain elevator, are now being put together at Jacksonville, the hulls being already in shape. Each dredge will be capable of making a clean cut of twenty-two feet in width. The dredges will be lashed in pairs, so that at one operation they will open a canal forty-four feet wide. To dig the canal from Lake Okeechobee to the St. Lucie River will require the excavation of 9,000,000 cubic yards, which, at a rate of two cents a yard (the Menge figure), will amount to $180,734, and at an outside figure of five cents a yard will amount to $451,336.

In addition to this canal it is the design to build another canal from Lake Okeechobee to the Caloosahatchie River, emptying into the Gulf; also to deepen and straighten the streams emptying into Lake Okeechobee, to dig lateral canals or ditches, and at various points to tap the ridge separating the saw-grass marshes from the Atlantic and the Gulf, thus draining the remotest sections of that great region.

MISCELLANEOUS INVENTIONS.

Mr. Edwin Thacher, of Pittsburg, Pa., has patented an improved bridge-truss. The object of this invention is to overcome the defects common to a greater or less extent in all forms of triangular or quadrangular truss now in use.

Mr. George Brucker, of New York City, has patented a nickel-plating fluid composed of a saturated solution of pure nickel in nitric acid, and of hyposulphite of soda and cream of tartar.

An improved slide for guard chains which can be adjusted very readily and can be used with chains of any desired thickness, has been patented by Mr. Lewis H. Sondheim, of New York city. It consists in a casing provided with a hinged or removable side and with a longitudinal partition dividing the casing into two compartments provided with springs for pressing the chain passing through the compartments against the opposite side of the casing, by which this casing is held on the chain in the desired position.