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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 569.

For the Week Ending November 27, 1886.

Price 10 cents. For sale by all newsdealers.

THE DYNAMITE CRUISER.

The report that the contract had been let for building a cruiser specially designed and fitted for armament with Lieut. Zalinski's dynamite throwing gun has been contradicted as premature; but it is admitted that such a cruiser is to be built upon plans practically identical with those stated in the above mentioned report, namely, length 230 ft., beam 26 ft., draught 7½ ft., estimated horse power 3,200, highest speed 20 knots. Under the supposition that this speed of 20 knots was intended to be a sustained speed, several critics have privately expressed their belief that no such vessel could be constructed; for they say that, inasmuch as the great 8,000 ton steamers are barely able to make 18 to 19 knots in crossing the Atlantic, with a developed 12,500 horse power, a small steamer, such as is above outlined, cannot be given the machinery to make 20 knots.

There is a certain axiomatic character to these criticisms; but the critics probably make a serious mistake in assuming that the speed of 20 knots is to be the craft's capacity for any great length of time. If she had a normal speed of fifteen or sixteen knots, which could be driven up by forced draught for even an hour or less to 20 knots, she would fulfill all the conditions necessary to success. For, under the lower rate of speed, she could overhaul almost any cruising fleet, or even any single cruiser, when making an ordinary service passage from one port to another. Then, not until the two craft were so close to each other as to recognize each other as enemies would the 20 knot speed be called for. It is not likely that a combat between an ironclad and a light unarmored cruiser could last long. Either the latter would soon plant a dynamite shell or two in her heavy antagonist and finish her, or else she would be sunk by the ironclad's heavy fire.

As regards the battery to be given to the dynamite gun cruiser, it is natural that so untried an experiment should produce a good deal of divergence of opinion. In its favor it is said that the acknowledged success of the gun on shore can undoubtedly be repeated at sea. Its accuracy, lightness, and inexpensiveness, coupled with the terrific effect of its projectile charged with dynamite, are all cited as advantages which make such a gun especially desirable for a nation like ours, which does not wish to spend large sums on heavy ironclads and expensive guns. Assuming, therefore, that a cruiser can be built, having high normal speed and the capability of increase for short periods to a unique speed; that she can carry all the air compressing machinery, etc., for her dynamite guns, without depriving her of coal carrying capacity; that she can work her guns as effectively at sea as they have been worked on land; that the long tubes will not be so affected by the constant tremor and vibration of a screw steamer at sea as to be thrown out of line or "buckled"—assuming these things, there is good reason to expect good results from this cruiser when built.

But it is urged that the experiment is not beginning right; that the conditions in the proposed experimental cruiser are not at all likely to be the same as they would be in a war ship intended for service cruising. In the first place, there is certainly an awkward uncertainty as to the position the two guns will occupy. It is evident that as each gun cannot be less than 60 ft. in length (possibly even 80 ft. may be requisite), the guns cannot be mounted in broadside on a craft having only 26 ft. as her greatest beam. Thence it follows that only a certain fore and aft style of mounting can be used, and that the guns can be fixed only in a limited arc on each side of the bow and stern. Granting four points on each side of the keel forward and aft, each gun would cover eight points only, leaving sixteen points in which the vessel could not fire at an enemy at all. Clearly such a limitation of her fighting powers would detract seriously from her efficiency, and it ought not to be permitted if it can be avoided.

There is one experiment that has not yet apparently occurred to the constructor of the so-called dynamite gun, or at least nothing has been done about it practically. If a very high elevation were given to it—say even 60°—the projectiles, instead of striking at a low angle, would fall perhaps a little more nearly vertical than they went up, and would strike the enemy's decks instead of the broadside plating. Inasmuch as the decks are always more vulnerable than the broadside, the effect of the dynamite shell exploding thereon would be more damaging to the ship struck than it would be if the shell exploded against the broadside. Such an unusual elevation would permit the guns to be fired even from the broadside of a narrow craft like the proposed cruiser, while they could equally be fired at low elevations from the bow and stern. Of course such a use of the guns would be practicable only at such close quarters as to expose the craft to machine gun fire, and the game might not be worth the candle; but it would seem to be nearly the only way of utilizing these exceptionally long guns in ships of narrow beam. In narrow channels defended on each side, like the Narrows, this method of using the dynamite guns might be very effective. They could be sunk deep in the ground and protected by earthworks, so that the guns and crews working them would be absolutely safe against the fire of a hostile fleet, while at the same time they could rain down shells upon the channel. Extremely accurate shooting could be secured with the compressed air guns, the effect of the wind being the only element of uncertainty; and twenty-five or thirty of these inexpensive guns, properly placed, ought to be sufficient to close any narrow channel against a hostile fleet.

The government may have adopted plans which will make the experiments on board this proposed cruiser conclusive; and while it seems at present as though she would be far from determining satisfactorily the practicability of using the dynamite-throwing gun at sea, it is well, in view of the importance of the issues at stake, to have the trial made.

TORPEDOES VS. RAMS.

The United States ship Tennessee, the largest in the service, and at present the flagship of the North Atlantic squadron, met with a mishap at the Brooklyn Navy Yard on the 14th inst. A steam cutter of small dimensions bumped against her port bow and opened a hole nearly three feet long. It is thirty years since the Tennessee was launched. While she is one of the most comfortable vessels afloat, it is said she has long outgrown her usefulness for war.

The ease with which the hull of our best war ship may be penetrated presents a striking contrast to that of some of the old iron hulks of the British navy. For example, they lately tried at Portsmouth an experiment to see how big a hole they could knock in the hull of the ironclad Resolute by exploding a first-class torpedo under her bottom.

A 16 in. Whitehead, charged with 93 pounds of gun-cotton, was lashed to a boom and laid in contact with the port side, amidships. It was about 8 ft. under the surface, and close to the bilge keel. The conditions were entirely in favor of the torpedo, and it was expected that the destruction of the vessel would be both sudden and complete. The result, however, fell very far short of the anticipation. The ship was slightly inclined by the force of the explosion, and then listed a little in the opposite direction. Beyond this and the upheaval of the water, there was nothing to be seen by the spectators. Investigation showed that the bilge keel had been shaken off to the extent of 30 ft., and the plating below much indented. Between the bilge keel and the armor belt the skin plating was forced in between the frames, and three or four strakes had parted in the middle for a length of 8 ft.; some of the butts had been opened, so that gashes 2 in. or 3 in. wide appeared at the junction. Internally, skylights were broken and the coal blown about, but only one compartment was penetrated. The exact amount of damage cannot yet be determined, but it is evident that the ship was not disabled, and could fight her guns perfectly well.

WORK AND HABITS.

If the Knights of Labor can infuse in the mass of the organization the same ideas of personal habits as are voluntarily acted on by the managers, they will do much to improve the status of workingmen, whether laborers or mechanics. There already has been much improvement in this respect, the change being attributable to more intelligent estimates of the value of good habits than those which prevailed a generation ago. It was considered not unusual for a first-class workman to have his periodical sprees, and to be a free liver in the coarser meaning of the term; indeed, the union of loose habits and the reputation for competence to do a good job appeared to be natural and expected. "Blue Mondays" were common, the best workmen not putting in an appearance until Tuesday, requiring a day to get over the weekly debauch. Such men appeared to consider that their skill as mechanics entitled them to a license that was injurious to themselves and harmful to the employer's interests.

But the employers tire of these practices, and the dissipated workman cannot so readily assume on his skill as an excuse for his bad habits; the old notion of the union of drunkenness and duty, of immorality and ability, of high pay and low habits, is exploded. One of the most competent and efficient foundry foremen the writer ever knew lost his place in the establishment where he managed nearly fifty men, and his caste in the community, by his persistent practice of intemperate drinking. Said the manager, shortly after his dismissal: "I hardly know how to fill his place. There are not half a dozen men in the country who are his equals in the mixing of irons, the tempering of sand, and the carefulness of general management. I never lost a casting under him of the value of ten dollars. But I needed him six days in the week, and I paid for his coolness, his judgment, and his full capacity. I do not require my men to become total abstainers, although some might benefit by that method; but I do want their intelligent work."

It may be a necessity that employs unreliable skill and presumptive talent, but employers will apply a remedy as soon as they can. The workman may be

certain that personal good character and personal good habits are compatible with steadiness in work and skill in handling tools. There is no proper show of independence in working five days and loafing two days because the man is a first-class mechanic, and can assume on that fact and the forbearance of his employer. One of the best, as well as one of the largest, establishments for building machinery in this country has its own temperance organization in the shape of a mutual improvement society, and the proprietors justly boast that they have the best *personnel* of any shop of an equal number of hands. There are no "blue Mondays" in this establishment.

Ex-President Chester A. Arthur.

Chester Alan Arthur, the 21st President of the United States, died in New York city, Nov. 18, aged 56 years. Called to the Presidency by the assassination of Garfield, he bore himself through all the lingering days of Garfield's helplessness in a manner which had as much of wisdom as of dignity, and gave assurance to the country that allayed excitement and quieted apprehension at a time when men's minds were in a state of great tension. His subsequent career of three and a half years in the Presidential chair constitutes such recent history as to be familiar to all. People felt that the government under his administration was in safe hands, and its conduct in general was such as gave satisfaction to men of all parties.

Of Mr. Arthur personally it is to be said, first of all, that he was always the cultivated gentleman. He was graduated from Union College at an early age, having to teach school winters during the latter part of his college life, and while commencing the study of law, to assist in paying his own expenses. He was always a diligent student, and came of a family of marked intellectual capacity, but he was courteous, affable, and winning in manner, almost by nature; and in all that he did his gentle breeding was as evident as were the breadth of his culture and the thoroughness of his equipment when he was suddenly called upon, by a strange decree of fate, to fill the highest office possible for an American citizen.

The Welsbach System of Gas Lighting by Incandescence.

This system, which is the invention of Dr. Carl Auer von Welsbach, of Vienna, consists in impregnating fabrics of cotton or other substances, made into the form of a cylindrical hood or mantle, with a compound liquid composed of solutions of zirconia and oxides of lanthenum (or with solutions of zirconia with oxides of lanthenum and yttrium), which mantle, under the influence of a gas flame, is converted into a highly refractory material capable of withstanding for long periods without change the highest temperatures which can be obtained from the most efficient form of atmospheric burners, and which, under the influence of such temperatures, glows with a brilliant incandescence, very white, and perfectly steady, and which, moreover, retains its woven or reticulated character; the organic volatile and carbonaceous matters being entirely burnt out, and replaced by an incombustible and highly refractory residual skeleton, which becomes by its brilliant incandescence the source of light in the burner. The light emitted is, at a distance, hardly distinguishable from a twenty candle incandescence electric lamp, and by a modification of the composition of the impregnating liquid, a yellower light is obtained, resembling that of the best gas lights, but much more brilliant, and with a saving of gas of from 50 to 75 per cent, and, being perfectly smokeless, it is incapable of blackening ceilings and internal decorations. The illuminating power of the lights is about ten candles per cubic foot of gas consumed, and the mantles last from 800 to 1,500 hours.

Tercentenary of the Introduction of the Potato into England.

It is proposed, says *Nature*, to hold a tercentenary potato exhibition at the St. Stephen's Hall, Westminster, from Wednesday, December 1, to Saturday, December 4, and to appoint one of those days for a conference, when some of the unsettled questions relative to the history, etc., of the potato may be discussed. The exhibition will consist of four sections: 1. A historic and scientific collection, to include early works on botany in which the potato is figured; maps showing the European knowledge of the New World three hundred years ago, and the proximity of potato-growing districts to the ports most frequented; early books on travels and voyages in which reference to the potato occurs; works and papers in which attempts to define the different species are made; illustrations of the species and varieties; contemporary references to the voyages of Hawkins, Drake, Grenville, and Raleigh. 2. Illustrations of potato disease, and works on the subject. (Sections 1 and 2 will be arranged under the advice of a committee of scientific gentlemen who have consented to give their co-operation.) 3. Methods for storing, preserving, and using partly diseased potatoes, etc. 4. A display of tubers of all the various varieties grown. (In this section, gold, silver, and bronze medals will be awarded. Each exhibit must be accompanied by a statement of date of planting, locality, nature of soil, etc.)—*The Garden.*

Progress of Naval Torpedo Boats.

The competition for the supply of new torpedo boats to Turkey, which has been carried on for some time past, has terminated in favor of a German firm. A contract has been signed for three torpedo cruisers and nine torpedo boats. The cruisers are to be 70 meters, 60 meters, and 45 meters long respectively, with a speed of 25 knots, 23 knots, and 20 knots. The torpedo boats are to be 37 meters long, with a speed of 22 knots. All will be armed with Hotchkiss guns, in addition to Swartzkopf torpedoes. The whole will be delivered within eighteen months.

The French Admiralty has ordered of the Society des Forges et Chantiers twenty-six first-class torpedo boats, of which sixteen are to be constructed, at a cost of 175,000f. (7,000*l.*) each, at the company's yards at Marseilles and La Seyne, and ten, at a cost of 173,000f. (6,520*l.*) each, at Havre. The former boats are to be delivered at Toulon, the latter at Cherbourg. The dimensions of the new torpedo boats are as follows: Length over all, 35 meters (115 ft.); breadth, extreme, 3·35 meters (11 ft.); depth of hold, 2·5 meters (8¼ ft.); draught aft, 2 meters (6½ ft.); displacement, fully equipped, 53¾ tons; minimum speed, 18 knots. Each boat is to have two torpedo launching tubes and to carry four torpedoes. The boats are to be constructed in seven watertight compartments. The coal bunkers, placed each side of the boilers, form for the latter a sufficient protection against light projectiles. All the material used in the construction of the boats must be of French manufacture. The trials include a forced and a continuous run. In case the maximum speed is less than 20 knots, 500 francs are to be deducted from the contract price for each tenth or each fraction of a tenth of a knot below that speed. Should the maximum speed, however, of any boat be under 18 knots, the boat in question will be rejected. During a continuous run of eight hours, the average speed must not fall below 12 miles an hour. The keels of two twin screw cruisers, the Surcouf and Torbin, have been laid down at Cherbourg and Rochefort respectively. The vessels will have the following dimensions: Length over all, 95 meters (312 ft.); breadth, extreme, 9 3 meters (30½ ft.); depth of hold, 7·05 meters (26 ft.); draught amidships, 4·24 meters (14 ft.); displacement, 1,844 tons. The speed of the cruisers is to be 19½ knots, and their engines are to develop 6,000 horse power. Their armament is to consist of two 14 centimeter (5½ in.) guns on the forecastle, three 47 millimeter (1·83 in.) quick firing guns, and four mitrailleuses, besides five torpedo launching tubes—two forward, one aft, and one at each side.

Smoking and Heart Disease.

In a report by Dr. Frantzel, of Berlin, on immoderate smoking and its effects upon the heart, it is stated that the latter show themselves chiefly by rapid, irregular palpitation of the heart, disturbances in the region of the heart, short breath, languor, sleeplessness, etc. Dr. Frantzel says that, if the causes of these complaints are inquired into, it is generally found that the patients are great smokers. They may not smoke cigars rich in nicotine, but full flavored cigars imported from the Havanas. Smoking, as a rule, agrees with persons for many years, perhaps for twenty years and longer, although by degrees cigars of a finer flavor are chosen. But all at once, without any assignable cause, troubles are experienced with the heart, which rapidly increase, and compel the sufferer to call in the help of the medical man. It is strange that persons consuming cigars of ordinary quality, even if they smoke them very largely, rarely are attacked in that way. The excessive use of cigarettes has not been known to give rise to similar troubles, although it is the cause of complaints of a different nature. The age at which disturbances of the heart become pronounced varies very much. It is but rare that patients are under thirty years of age; they are mostly between forty and sixty years old. Persons who are able to smoke full flavored Havanas continue to do so up to their death. If we look round among the better classes of society, who, it is well known, are the principal consumers of such cigars, it is astonishing to find how many persons with advancing years discontinue smoking. As a rule, affection of the heart has caused them to abjure the weed. In such cases the patient has found the best cure without consulting the medical man. If he makes up his mind to discontinue smoking at once, the complaint frequently ceases at once; in other instances it takes some time before the action of the heart is restored to its normal state. In such cases, besides discontinuing smoking, relief must be sought also by regulating the diet, taking only easily digestible food, light beer and wine in moderate quantities, abjuring coffee, as well as by short walks, residence among mountains of moderate elevation, and suitable interior treatment. By taking this course, all symptoms disappear in the course of a year, and do not reappear if the patient does not recommence smoking. In a third category of cases, the more acute disturbances leave the patient; he feels well and hearty, but an irregularity of the heart, more or less pronounced, is left behind. It has not yet been determined what it is that makes smoking injurious; but this much appears certain, that it does not depend upon the amount of nicotine which cigars may contain.

Old Spanish Mineral Specimens.

According to *Die Natur*, a remarkable collection of minerals exists in the cellars of the Academia San Fernando, at Madrid. It is contained in a number of boxes, which have filled the cellars for about 200 years, and which may remain there as long again unless some better fortune befalls them than that which has attended them in the past. They come down from the golden age of Spanish domination in South America and in Mexico, when the mines of these regions made them the El Dorado of the globe. No one knows exactly the contents of the boxes, but they are believed to contain the rarest objects, although the scientific importance of collections was but little appreciated in the days when this one was made. It appears also that collections made by Humboldt during his travels in America, and handed over by him as a kind of scientific tribute to the Spanish Government, are in the same academy, "locked up since 1804, in a press, untouched." With respect to the famous skeleton of the *Megatherium americanum*, Cuv., found by the Marquis de Loreto on the banks of the Rio Luxon, near Buenos Ayres, in 1778, which is in the Museum of the Academy, its present state is described by the Brothers Fraas, of Stuttgart, in their letters from the south of France and Spain, just published under the title of "Aus dem Suden," as being one of the utmost confusion. The bones are bored for mounting, but they are "completed and restored" to the verge of the impossible. The bones are placed in absurd positions, and parts which were inconvenient to the mounter are put aside altogether. The writers ask what the state of instruction in natural history must be in an academy where such things are possible.

The Australian Frozen Meat Trade.

In a letter written last month, the Melbourne correspondent of a Scotch paper gives some interesting data regarding the frozen meat trade of that city. He says that though the frozen meat companies have not been very successful, the Melbourne one having been wound up some months ago, yet since the works passed into other hands there is promise of success. Instead of purchasing sheep, as did the original company, the present owners of the works only kill, freeze, and ship the sheep for private owners at specific rates, the owners themselves taking all risks of sales in London. This new system, which has for some time been in vogue in New Zealand, came into operation in Melbourne last April, and up till the dispatch of the correspondent's letter, as many as 50,000 sheep had been frozen at the works at Williamstown.

The graziers who consigned on their own account to London agents were pleased with the returns, as they found, after paying all expenses of freezing, freight, and commission, they had got more per head for their sheep than the prices realized for similar animals sold alive in the Melbourne market. Such shippers actually realized from 15s. to 17s. 6d. per frozen sheep, when the market rates in Melbourne for live sheep were only 12s. a head. But even had they realized only 12s. for the frozen carcass, they would continue to take all the trouble and risk of sending the meat to London, because one of the main objects of doing so is to reduce the surplus stock in Australia, which without an outside market to resort to, sheep become a glut in the colony, and probably without such outlet would have to be sold for 5s. or less per head, or be got quit of by being boiled down for tallow.

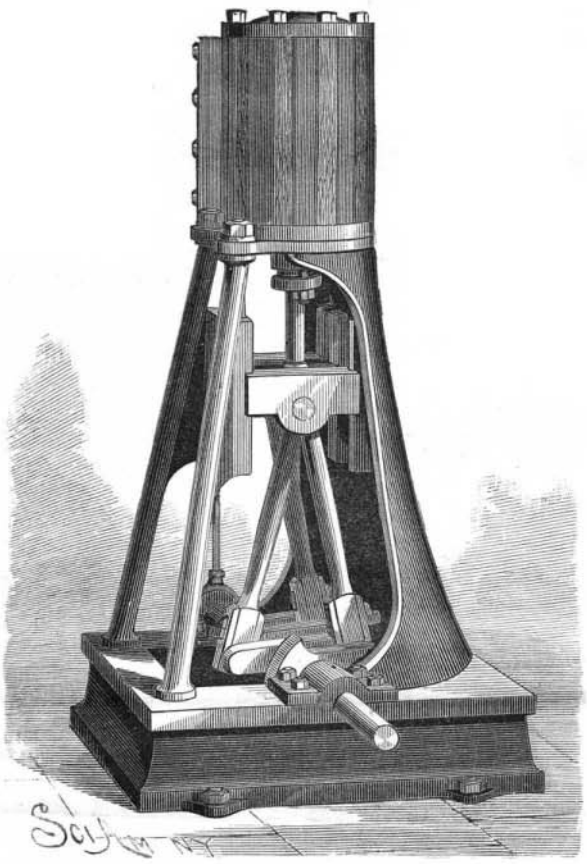
Steel Pipe.

It is reported by the Berlin *Eisenzeitung* that the new process for making steel pipes employed at Burbach is very successful. A syndicate has been formed to build works at Burbach, the capital being 1,200,000 marks, of which 500,000 marks are issued to the patentee, A. Mannesmann, of Remscheid. It is stated that Funke & Ebers, of Hagen, Germany, have also purchased patent rights, and a large firm in Paris propose to apply the method to the manufacture of copper tubing. As to the process: As soon as the steel is cast into the round mould, a core is thrust into the steel, so that a tube is formed between it and the walls of the mould. In order to prevent cracking of this annular casting during cooling, the core is so made that it follows up the shrinkage of the steel. The steel cup thus obtained may then be rolled in an ordinary train.

A BIG gopher snake was killed recently at Dayton, Fla., in whose stomach was found a three foot rattlesnake, still alive. The gopher was over six feet in length.

IMPROVED BALANCED STEAM ENGINE.

Of the moving parts of a steam engine, the piston, piston rod, and crosshead have only a reciprocating motion, while the connecting rod has both a reciprocating and rotary motion, the rotary motion being almost *nil* at the connection with the crosshead,



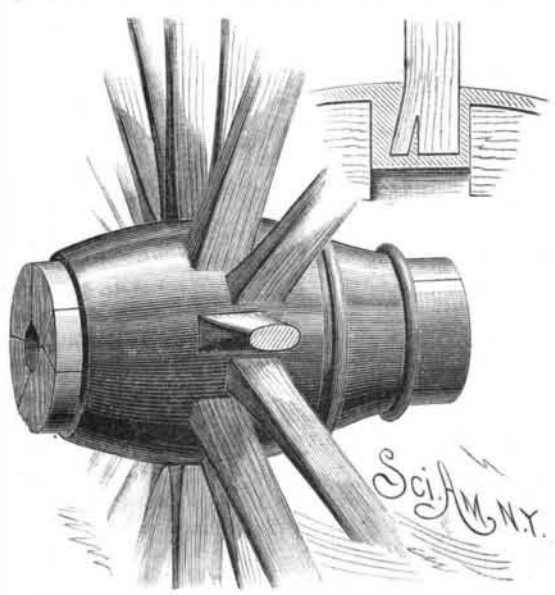
LOUQUE'S BALANCED RECIPROCATING COUNTER-WEIGHT ENGINE.

and being almost perfectly rotary at its connection with the crank, which has, of course, only a rotary movement. To perfectly balance these motions, it is necessary to counteract the effects of the one by the other. In the engine represented in the accompanying engraving, this end is reached by a simple and admirable arrangement of counterbalancing parts. The engine has a three-crank shaft. The connecting rod being weighed, its weight is divided in two equal parts, and a rod is connected to each of the crank pins opposite the main crank. These rods always move in opposition to the connecting rod. The piston, piston rod, and crosshead are also weighed and the weight divided in two equal parts, are placed at the end of the balanced rods, and are made to move in slides running parallel with the crosshead. The engine is thus perfectly balanced. The inventor did not deem it necessary or useful to counterbalance the slide valves. The effect of such counterbalancing has been so extraordinary in its practical results that these engines have been run without bolting to the floor and without flywheel, at either slow or high speed. The counterweights can be applied to any engine.

Further particulars can be obtained from the patentee, Mr. Charles Louque, 31 Carondelet Street, New Orleans, La., and from our Business and Personal column.

IMPROVED WHEEL HUB.

The hub is adapted to give a staggering arrange-



GRASBERGER'S IMPROVED WHEEL HUB.

ment to the spokes, while it secures the greatest possible strength without destroying the symmetry and beauty of the plain wooden hub. The body of the hub is composed of two wooden end sections, which are bored to receive the axle, and are fitted within a metal shell, which is constructed with recesses forming pockets for the spokes. In the construction here illustrated, the spokes are held in place by being made to spread out laterally by a locking wedge, as shown in the sectional view. The outer and inner wooden end blocks, which form the core of the hub, are turned to shape, then cut in five pieces, one of which is wedge shaped, to form a key for the whole; or they can be steamed and forced into the hub.

This hub receives the full size of the spokes the whole length of the tenon, and repairs are easily made, as the spokes are independent of each other. It is impossible for the grease to get in around the spokes, in case of a loose box.

This invention has been patented by Mr. Boniface A. Grasberger, of 1448 East Franklin Street, Richmond, Va.

How Plaster Casts are Made—Col. Pat. Gilmore's Plaster Cast.

The St. Louis *Globe* gives the following amusing account of Col. Pat. Gilmore's experience in the hands of a couple of youthful modelers: "I went to the studio at the hour fixed, and was to be met there by a well known sculptor, who had courteously undertaken to do the modeling himself. By some unfortunate mischance, he failed to put in an appearance. Two apprentices were vigorously stirring the liquid plaster of Paris or whatever villainous compound is used for the purpose. After about half an hour's waiting, it was decided to proceed in the great man's absence, and I was invited to disrobe. A much-beplastered white sheet was wrapped around my neck and shoulders tightly, and my face and hair were liberally greased to prevent the plaster sticking to the flesh. Pieces of paper were stuffed into my mouth, nose, and ears, and I was told to shut my eyes. No sooner had I done so than my persecutors commenced pouring the liquid on my head. One poured while the other pressed the rapidly hardening compound so as to fill every recess and get a cast of every feature. They poured a great deal too much on, and soon my head was incased in a mask as hard as iron. The heat was insufferable. I could not move my head, for the awful weight threatened to dislocate my neck if I did; my eyes seemed being pressed into my brain, and the paper circlets not proving adequate for their purpose, I began to feel the first symptoms of suffocation. I could not call out, and believed myself to be dying. But my troubles had barely commenced. The apprentices had not fixed the centerboard, or slit, properly, and when they mercifully decided to release me, they found the cast would not come in half as it usually does. In a successful operation the two halves are joined together after removal, and a perfect reproduction of the face and head easily produced; but in my case both dividing board and grease had been overlooked, and the only course left was to smash the mask off. Mallet and chisel were used, producing an effect like concussion of the brain. Finally my face was freed, and I was able to breathe, and make a few remarks to the boys on their carelessness. Then it transpired that they had omitted to grease behind my ears, and the plaster adhered to the skin like glue. To remove the former, the latter had to be torn away, and when at last I got away I was a mass of blood and sores. After two weeks' medical attention I got about right, but the memory is still fresh."

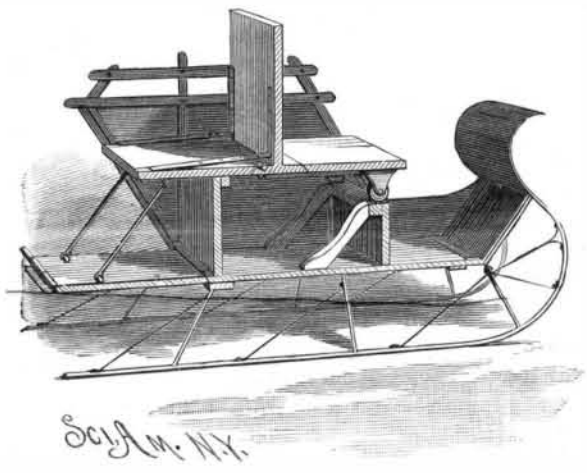
How to Collect Mosses.

At the meeting of the Royal Society of Tasmania on July 13, Mr. R. A. Bastow, F.L.S., read a paper on the collection, observation, and identification of mosses, from which we take some practical hints. The collector should provide himself with a good pocket lens, a table knife, a piece of carpet 12 by 8 to kneel upon, very capacious pockets, two or three old newspapers, a small billy, and refreshment. The latter is an absolute requisite, for it is wonderful how voracious one becomes by the time that the furthest point of the collecting ground is reached.

Mr. Bastow makes it a rule never to collect anything on the journey outward, no matter how tempting a tuft of capsules may be. It is better just to mentally note them and pass them by in going; they may just as easily be secured on the return. Every tuft of moss that is gathered should be carefully folded in paper, so that the species may be kept separate. However beautiful a medley tuft of moss may be, it is better left behind; tufts of one species only should be looked for. Mosses thus gathered will keep a long time, but it is better to wash them and lay them tastefully between blotting paper under pressur for a few days. They are then both dry and rigid, and may be packeted and labeled at once, or placed in an album, or mounted on glass slips as slides for the microscope. The author has prepared a key to the study of Tasmanian mosses, which is a new feature in the introductory portion of bryology. The Tasmanian mosses are the first in the botanical world to be diagrammatically arranged, so that the student may have all the genera before him on one sheet, so bracketed and arranged that he can speedily find out the genus of the specimen in hand. One species of each genus is represented, in its natural size and as it appears under the microscope with a 1½ inch objective. The key also contains short generic descriptions; these, in conjunction with the list of Tasmanian genera, their authors, the English meanings of the generic names, and the habit of each genus, in the body of the paper, will afford great assistance.

IMPROVED VEHICLE SEAT.

The object of this invention, which has been patented by Mr. James Steele, of Guelph, Ontario, Canada, is to so construct a vehicle seat and body that it may be arranged as a single or double seated vehicle. The body of the vehicle is provided with a hinged back, to which is connected a tilting seat, by rods jointed to the seat and back of the body. An auxiliary seat is hinged to an extension of the back of the main seat, and provided with rollers running upon guides placed in the body below the main seat. When only a single seat is required, the back is raised to a vertical position, thereby bringing the main seat into a horizontal position, where it is supported by the frame of the vehicle. At

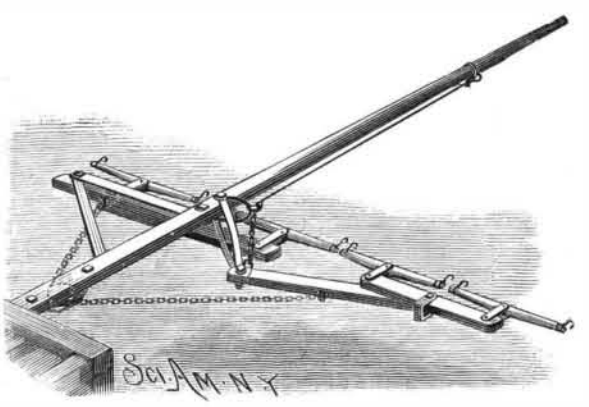


STEELE'S IMPROVED VEHICLE SEAT.

the same time the auxiliary seat is folded under the main seat, its rollers riding along the guides, and the end board is brought against the rear ends of the side pieces of the body. When two seats are desired, the back is lowered to a horizontal position, to form the rear seat, while the main seat is brought into a vertical position, so as to serve as a back to both seats. The auxiliary seat is carried upward, and forms the front seat. The end board is lowered, and becomes the foot board for the rear seat. The engraving represents the seat arranged in this manner.

DRAUGHT EQUALIZER.

The simple and efficient draught equalizer here illustrated is designed to be used with four horses abreast. To the tongue are secured two bars united at their outer ends, and one of which is at right angles to the tongue. Upon the bolt connecting the ends is pivoted one end of an equalizing bar extending beneath the tongue, and to the under surface of which, at the free end, is pivoted an equal armed evener, having single trees at each end. To the tongue, a short distance in front of the bar, placed at right angles, are pivotally connected two bars, between whose rear ends is pivoted one end of a second equalizing bar. The centers of the two equalizing bars are connected by a chain passing around a sheave in a frame secured to the under side of the tongue, near its rear end. To the outer end of the second equalizing bar is pivoted an evener, provided with two single trees. Upon each of the bolts holding the bars connected with the inner end of the second equalizer is placed a clevis. These are connected with a rod secured to a ring encircling the forward end of the tongue. This arrangement limits the rearward swing of the two bars, and fixes the inner end of the



HOLCK'S DRAUGHT EQUALIZER.

second equalizing bar. By means of this arrangement of equalizing bars and chains, a thorough equalization of the pull of the four horses is obtained, and, to a great extent, side draught is avoided.

This invention has been patented by Mr. Charles F. Holck, of Laporte City, Iowa.