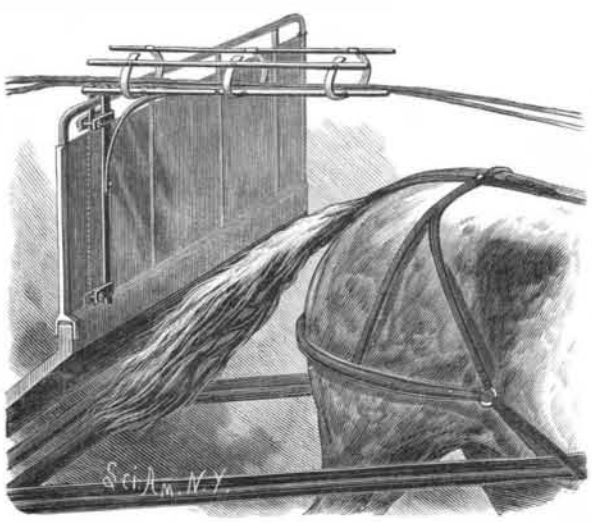
REIN PROTECTOR.

This device is attached to the dashboard of the vehicle, and is intended to inclose the reins, so as to prevent the horse from getting them under its tail. To the bottom bar of the skeleton frame are secured elliptical rings, the upper sides of which are split and separated a sufficient distance to admit of readily placing the reins within and removing them from the rings. To the tops of the rings, on opposite sides of the slits, are secured bars. Secured at right angles to one end of the lower bar are two rods, placed a suitable distance apart to receive the dashboard between them. These bars are held to the dashboard by U-shaped



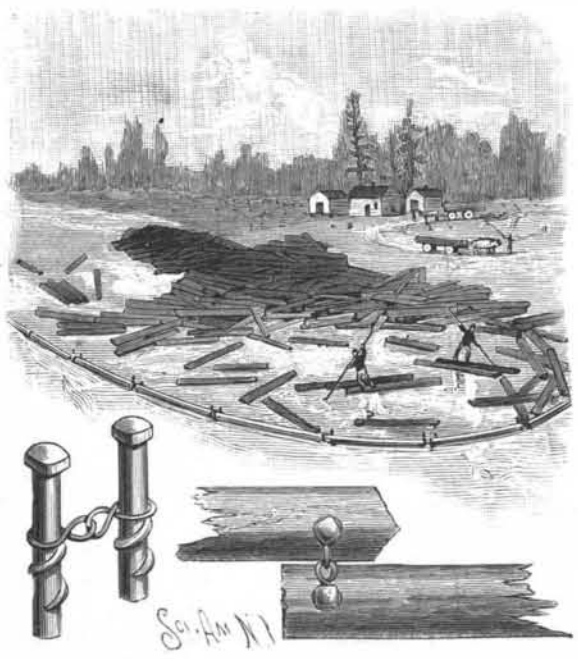
LEITH'S REIN PROTECTOR.

clips, as shown in the engraving. The horizontal part of the protector—that stretching in front toward the horse—has a maximum length of fifteen inches, and is raised sufficiently to have the reins at least six inches above their ordinary height. The protector may be applied to either side of the vehicle, and it is evident that when the reins are placed in the rings they will be protected against interference of the horse's tail.

This invention has been patented by the Rev. David Leith, of Trenton, Tenn.

RAFTING BOOM PIN.

This boom pin is designed to be used in connection with a link or other coupling for forming rafts and booms in rivers for retaining floating logs, etc. The pins are used in pairs, united by a coupling consisting of two united twisted links placed one upon each pin, as shown in the lower left hand corner of the engraving. The pins are preferably made of iron or steel, blunt at one end and formed with a square head at the other end. The edges of the head are slightly rounded, in order to lessen the tendency to gouge into the logway and bend the pin. Upon each pin, near the blunt end, is formed a spiral flange, which engages with the wood of the timber in which it is inserted.



BUISSON'S RAFTING BOOM PIN.

The spiral is of very steep pitch, in order to leave a portion of the body of the pin between the coils, and its lower end is beveled to a point and terminates flush with the surface of the pin just above the end. In applying these pins a hole is bored in the two sticks of timber to be united, the holes being slightly longer than the body of the pin. The pins are then screwed down by a key or wrench applied to the heads. The spirals enter the wood, and securely hold the pins to the timber.

This invention has been patented by Mr. Cyprian Buisson, of Wabasha, Minn.

On the Absorption and Elimination of Mercury in the Human Organism.

Dr. Welander has made a series of experiments to determine how mercury is absorbed by and eliminated from the body. To the urine is added liquor sodæ and a little honey, and the mixture boiled for a quarter of an hour in a retort. Then the liquid is poured out into a glass, where it is left until complete precipitation has taken place. Next, the fluid is poured off, and the precipitate is placed in a glass retort. A little hydrochloric acid is added, and a piece of copper wire, three centimeters long and half a millimeter thick, which has just been heated to a red glowing heat, is placed in the retort. The fluid is now heated to the boiling point, and the opening of the retort closed with a cork, after which the retort is placed in an oven at a temperature between 95° and 149° F., and left there for thirty-six or forty-eight hours. At the end of that time the wire is taken out, dried, and placed in a thin glass tube, the opening of which is closed by melting. That part of the tube which contains the wire is heated over a very weak flame of an alcohol lamp. In consequence of this procedure, the mercury is sublimated, and deposited as small metallic globlues in the upper part of the tube.

The presence of iodine salts prevents the precipitation, and they must, therefore, be removed from the urine if it contains any. The best way of doing this is to collect the precipitate formed after the first boiling on a filter, and pour a little water on it once or twice. We must not take too much water, because the mercury is soluble in water.

The test described is so fine that mercury has been found in a solution of corrosive sublimate of 1 in 10,000,000.

The experimenter must make sure that his reagents do not contain any mercury, which is often the case with hydrochloric acid.

Sometimes the globules of mercury are visible to the naked eye, but the safest way of examining them is by means of the microscope.

When mercury is given by the mouth, it appears, as a rule, in the urine one or two days later. Administered through the anus, it was already found the following day. When applied through the skin, it appeared likewise, as a rule, on the following day in the urine.

Mercury is rapidly absorbed by wounds and ulcers.

Injected under the skin, mercury is very rapidly absorbed, and appears often in the urine as early as one or two hours after the injection.

Mercury is constantly eliminated with the urine; a very great part, and perhaps the greater part, of what has been introduced into the body leaves it in that way.

The salivary glands play quite a secondary role in this respect.

The fæces, on the other hand, contain constantly mercury, and often in considerable quantity.

Mercury is likewise eliminated with the milk, and was found in the urine of the nursling.

The elimination takes place in proportion to the amount introduced.

Welander discredits the statement of Paschkis and Vajda that mercury may remain for twelve or thirteen years in the body. He has, as a rule, found it four or six months after the end of the treatment; frequently it is found from six to twelve months, and sometimes even more than a year, after the treatment has been discontinued.

Welander thinks mercury circulates in a soluble form with the blood. He found it in abundance in this fluid in every case examined. He found it likewise in pus taken from patients treated with mercury, and in ascitic fluid.

The conclusion to be drawn for practice from these experiments is that when a rapid and powerful effect is aimed at, the administration of mercury by hypodermic injections is preferable, while for the intermittent treatment of Fournier the mercurial pills will do as well.—*Dr. Edward Welander, Abst. fr. Nordiskt Medicinisk Arkiv, xviii., No.* 2, 1886.

Defense of New York within Thirty Days.

Captain Ericsson, of Monitor fame, writes as follows to the New York *Herald:*

I have read with much attention the editorial paragraphs published in several journals relating to the Destroyer and its submarine gun, and beg to state for the information of all concerned that the Destroyer system so completely solves the problem of applying submarine artillery for defending harbors that I have had no occasion to waste time on the consideration of any other method. Moreover, the extraordinary caliber of the submarine gun employed in the Destroyer, viz., 16 inches, has presented no practical difficulties, and has not failed in a single instance during a long series of trials to expel the submarine projectile with a velocity exceeding 300 feet in three seconds.

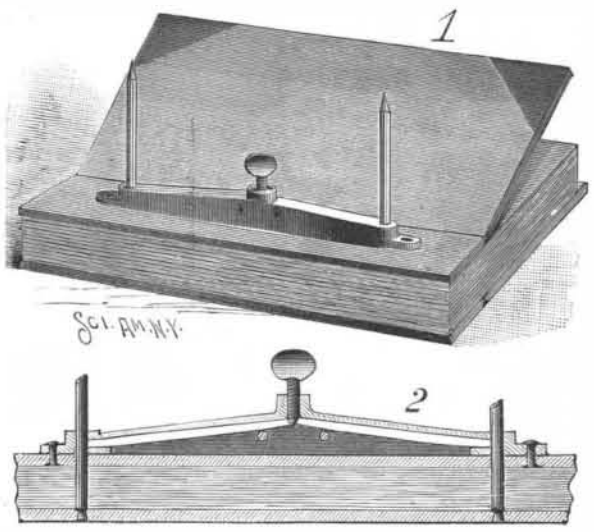
It should be mentioned that this projectile is 25 feet long and carries 300 pounds of guncotton, a charge sufficient to shatter the hull of ironclad ships of all classes so completely that the boasted "water-tight compartments" will prove of no avail in preventing destruction and sinking.

JOHN ERICSSON.

BINDING FILE.

The accompanying engraving represents an improved binding file, which is the invention of Mr. James W. Dickieson, of 17 and 19 Rose Street, New York city. Near one end of the bottom cover are two upright rods, pointed on their upper ends. To the upper surface of the top cover is fastened a guide frame formed with apertures fitting over similar ones in the cover. In a recess in the guide frame are placed two bars, held at one end by a bearing in the frame, the other end being supported by a pin. Through the middle of the guide frame passes a screw, which is pointed at its lower end. The sectional view, Fig. 2, clearly shows the arrangement of these parts.

In order to place additional documents on the file, or



DICKIESONS' BINDING FILE.

to remove those already on, it is necessary to remove the top cover. The documents are placed over the pointed uprights and pressed downward in the usual way, when the top cover is placed on the rods and moved down until it rests on the papers. The thumbscrew is then screwed down so that its pointed end forces the bars outward until they press against the uprights, and thereby lock the top cover in place. When the thumbscrew is turned in the opposite direction, the bars are released from the uprights. The cover and any of the documents can then be removed, the thumbscrew serving as a handle.

CHILD'S TRAY.

In this tray provision is made for holding a plate in a protected position, and also for receiving a drinking vessel, while any liquid spilled upon the tray will find its way to an under or subsidiary tray. In the bottom of the main tray is a large circular opening, the edge of which is struck up to form a convex or embossed surface. The purpose of this opening is to expose the receiving surface of a plate placed upon the under tray and held firmly by the inwardly curved edge of the opening which bears upon it, as shown in the lower sectional view. The convexed surface accommodates the flaring sides of the plate, and serves as an additional stay therefor. Toward the upper right hand corner of the tray is an opening to receive a glass, and

COUSINS CHILD'S TRAY.

at intervals in the bottom are cut drain apertures, through which any spilled liquid will flow to the subsidiary tray, which is of the usual construction, and in which the main tray rests. In such a tray the child has easy access to the contents of the plate, but cannot remove the plate itself, and the glass is so held that it is not liable to be overturned.

This invention has been patented by Mr. Thomas Cousins, of Norwalk, Conn.

Left-Handedness.

Dr. Daniel Wilson, president of the Royal Society of Canada, has lately contributed a paper to the *Proceedings* of that society on the subject of left-handedness, to which he has managed to give an unexpected and very practical interest, affecting all who have children or who are concerned in their education. The author had written previously on this subject, but not with such full and effective treatment. He reviews the various causes to which the general preference of the right hand has been ascribed, and also those to which the occasional cases of left-handedness are attributed, and finds them mostly unsatisfactory. He shows clearly that the preferential use of the right hand is not to be ascribed entirely to early training. On the contrary, in many instances where parents have tied up the left hand of a child to overcome the persistent preference for its use, the attempt has proved futile. He concludes that the general practice is probably due to the superior development of the left lobe of the brain, which, as is well known, is connected with the right side of the body. This view, as he shows, was originally suggested by the eminent anatomist, Professor Gratiolet. The author adopts and maintains it with much force, and adds the correlative view that "left-handedness is due to an exceptional development of the right hemisphere of the brain."

A careful review of the evidence gives strong reason for believing that what is now the cause of the preference for the right hand was originally an effect. Neither the apes nor any others of the lower animals show a similar inclination for the special use of the right limbs. It is a purely human attribute, and probably arose gradually from the use, by the earliest races of men, of the right arm in fighting, while the left arm was reserved to cover the left side of the body, where wounds, as their experience showed, were most dangerous. Those who neglected this precaution would be mostly likely to be killed; and hence, in the lapse of time, the natural survival would make the human race, in general, "right-handed," with occasional reversions, of course, by "atavism," to the left-handed or, more properly, the ambidexterous condition. The more frequent and energetic use of the right limbs would, of course, react upon the brain, and bring about the excessive development of the left lobe, such as now generally obtains.

The conclusions from this course of reasoning are very important. Through the effect of the irregular and abnormal development which has descended to us from our bellicose ancestors, one lobe of our brains and one side of our bodies are left in a neglected and weakened condition. The evidence which Dr. Wilson produces of the injury resulting from this cause is very striking. In the majority of cases the defect, though it cannot be wholly overcome, may be in great part cured by early training, which will strengthen at once both the body and the mind. "Whenever," he writes, "the early and persistent cultivation of the full use of both hands has been accomplished, the result is greater efficiency, without any corresponding awkwardness or defect. In certain arts and professions, both hands are necessarily called into play. The skillful surgeon finds an enormous advantage in being able to transfer his instrument from one hand to the other. The dentist has to multiply instruments to make up for the lack of such acquired power. The fencer who can transfer his weapon to the left hand places his adversary at a disadvantage. The lumberer finds it indispensable, in the operations of his woodcraft, to learn to chop timber right and left handed; and the carpenter may be frequently seen using the saw and hammer in either hand, and thereby not only resting his arm, but greatly facilitating his work. In all the fine arts the mastery of both hands is advantageous. The sculptor, the carver, the draughtsman, the engraver, and cameo cutter each has recourse at times to the left hand for special manipulative dexterity; the pianist depends little less on the left hand than on the right; and as for the organist, with the numerous pedals and stops of the modern grand organ, a quadrumanous musician would still find reason to envy the ampler scope which a Briareus could command."

That all this is true is abundantly shown by the numerous examples cited by the author, from the greatest of artists, the left-handed Lionardo da Vinci, to the distinguished ex-president of the American scientific association, Prof. Edward F. Morse, and (we may add) to Dr. Wilson himself, both of whom are known to be accomplished draughtsmen with this too-neglected hand. In view of these facts, it is evident that few more important subjects can be offered for the consideration of educators than that which is presented in this impressive essay.—*Science.*

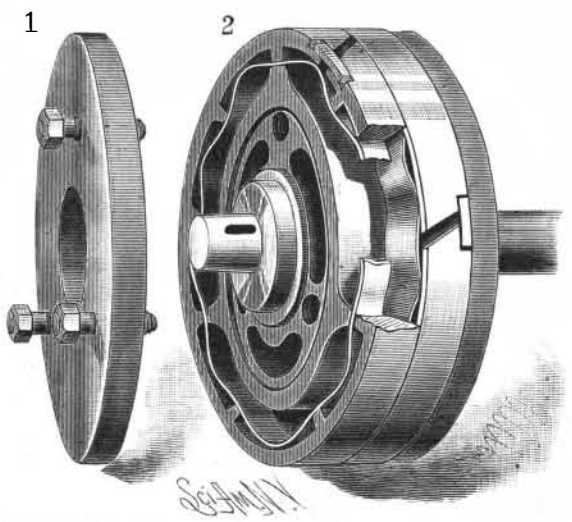
Thirty-three Years Ago.

Mr. James P. Slater, of Baxley, Ga., in a letter referring to some patent business recently transacted for him through this office, adds as follows:

"Accept my thanks for the prompt manner you have done my business. You are the same old Munn & Co. you were in 1854, when you obtained a patent for me on circular saws."

PISTON HEAD FOR STEAM ENGINES.

Two split metal packing rings are placed upon the body of the piston, which has a flange at one side of less diameter than the cylinder. Upon the other side of the piston an annular disk, Fig. 1, is held by bolts. The disk is of the same diameter as the flange, and the adjacent faces of both are faced off to form flat and true seats for the outer edges of the two packing rings. The body of the piston, between the screw-threaded openings, is recessed to reduce its weight, and opposite each opening a projection or lug is formed to strengthen the body at the points where the bolts enter it, while between these lugs the metal is removed to still further lessen the weight. The packing rings are duplicates of each other, each being split diagonally, and are constructed to form a recess in their outer edges, opposite the openings, to receive small blocks, shown in the perspective view, Fig. 2, which serve as steam checks, to prevent steam from entering the piston head at the openings. Each steam check is held in place by a small lip, which enters a corresponding depression formed in the side recess of each ring. Upon the inner surfaces of the rings are formed lugs, and a circular spring, fitted within each ring, acts to expand it. The springs are endless, and are corrugated in such a way as to bear upon both the lugs and inner surface of the rings between the lugs, so that they may be readily introduced, and so that their outward pressure will be equal at all parts of the rings. Between the two rings is placed a



McCART'S PISTON HEAD FOR STEAM ENGINES.

corrugated spring, the waves of which form opposite small curved springs, which are compressed when the bolts of the disk are screwed down, so that they act constantly to spread the rings apart, and thus force their outer flat surfaces against the flat seats of the flange and disk to form steam-tight joints that prevent the steam from entering the piston head between the rings and their confining surfaces. The adjacent surfaces of the rings are slightly cut away, to form a space for the interposed spring, and to form outer surrounding lips to confine the spring.

This invention has been patented by Mr. John McCart, of 204 East 21st Street, New York city.

An Improved System of Gas Lighting.

There was recently shown at the Marlborough Picture Gallery, Pall Mall, London, an interesting system of gas lighting, the invention of Dr. Carl Auer von Welsbach, of Vienna. This system produces a pure, steady, and brilliant light, which is perfectly smokeless, and has comparatively little heating effect on the atmosphere. The system might be described, in fact, as partaking of the character of a new form of gas burner, called the Welsbach lamp, which can be screwed on to all ordinary gas fittings. There is placed within the gas flame—of special form of atmospheric or Bunsen burner—a mantle or hood of cotton net or webbing that has been previously steeped in a solution containing oxides of the elements zirconium, lanthanum, and some other bodies. The moment that a prepared mantle is ignited it burns away with the smoky flame characteristic of burning cotton, but it leaves behind it a residual skeleton composed of the incombustible oxides contained in the impregnating solution; and this skeleton, while preserving its woven or reticulated character, becomes, under the influence of the Bunsen flame, powerfully incandescent, emitting a white and brilliant light, resembling somewhat that of an incandescent electric lamp.

It is stated that the mantles so employed last from 800 to 2,000 hours, and they, of course, can be renewed. Further, it is claimed on behalf of this system that it effects a saving in the gas consumed. It is represented that while a standard Argand gas burner, consuming five feet of gas an hour, gives an illumination equal to 16 standard candles, or 3·2 candles per cubic foot of gas an hour, the Welsbach burner produces a purer light of 20 candles with 2½ feet of gas per hour, showing an efficiency of 8 candles for each cubic foot of gas consumed. As the gas consumed is employed solely to heat the light-giving mantle, it need possess no illuminating property in itself, and therefore gas of poor illuminating quality may be employed under the Welsbach system, with a corresponding saving of cost. The Marlborough Picture Gallery was lighted by 56 Welsbach lamps attached to brackets arranged along a central pipe running from end to end of the gallery.

Hints on Building.

Put up the frame and get a roof over it as soon as may be, say in May or earlier. Then let it stand until the first of September to season. This is the old fashioned way, and it has advantages which those who have had experience with shrinking timber will not be slow to appreciate. In this part of the country the timber for a frame is always green when it is put up. Indeed, hemlock could not be worked very well dry. It is much better to have the shrinkage done before the inside finish is on than after.

All floors should be double. A layer of sheathing paper between them would not be a bad idea, and would pay for itself. The upper floor ought to go down after the mason work is done. A smooth, nice floor is a great preserver of carpets.

Back of the wash boards the space should be filled in with bricks. The ends of the floor timbers ought to be filled in such a way as to prevent rats and mice from having a free passage. Such a filling greatly diminishes the danger from fire.

Do not let the tinman or the contractor persuade you that the gutters should be left until red with rust before they are painted. It is a plan which is designed to benefit them exclusively. The paint goes on more easily after the red rust begins. The tin, however, has begun its own destruction, and will go on rusting under the paint just as steadily as though it had no protection, though perhaps not quite so fast. Tin roofs should not be allowed to get red. They can be cleaned and painted on one side in the shop. The objection to this is that the resin or acid (none of the latter should be used) needs to be cleaned off by the rains, so that the paint will stick. The best plan is to have the cleaning done at once, without waiting for the rain.

All piping should be put into the house while it is in the frame. This saves expense and much cutting of woodwork. Alongside each chimney it is a good plan to have a space extending from floor to floor in which pipes can be run if desired. The chimney breasts and the spaces which they cover ought to be plastered on wire lath, for safety, and thus avoid shrinkage.

Have a spare flue in each chimney, to be used for ventilation. The open fireplace, as a ventilator, however, is a delusion. Make openings into the flue at the base board, and by proper management of doors and windows, perfectly pure air can be secured in every room.

Heat by a big hot air furnace several sizes larger than the furnace makers recommend. This furnishes the means for perfect ventilation, by providing an ample supply of warm, pure air. Keep the pipes and registers perfectly clean, or the smell of cooked dust will be mistaken for that bugaboo "burnt air."

In plastering do not use a "brown coat" of mortar. Put the finish directly on the "scratch coat." Time, labor, and patience will be saved, and the work will be better, harder, and more durable. Build the foundations for the piers, in the cellar, with as much care and deeper than those of the external walls. These piers support the center of the house, and they are frequently neglected. The result is a great crop of cracks in the plaster.

Have the walls of the upper floor 9 feet high in the clear, even if you have to cut off six inches from the floor below. This is of course for a moderate size of house. High ceilings for sleeping rooms tend toward giving the sleepers purer air by furnishing greater space. When one is drawing plans, it is best to consult with a carpenter and see whether the framing will come out even multiples of commercial lengths. It is sometimes cheaper to use the full lengths of the timber than to cut off six inches from the ends. Increasing the size of a house six or eight inches may frequently be done without any appreciable addition to the cost.

In designing, get the inside arrangement right. Have places for every piece of furniture. Arrange the bedrooms so that they will contain beds without putting them against doors or windows. Put them against inside walls if possible. Have some connecting rooms and some which do not. After all this is done, put the outside on. Let doors and windows come where they will, and do not spoil your own comfort for the sake of an external appearance which is for the benefit of your neighbors.

Lastly, have a garret by building a sharp roof. Cover the roof with dark colored slate from Maine or Vermont. Lay it in cement, and be happy.

Moral: Alterations on paper cost much less than those in wood and stone. Therefore it is better to spend a long time over the plans than to make changes on which the builder charges his own price.—*The Mechanical News.*