NEW APPLIANCES FOR WOOL SCOURING AND DYEING.

[Condensed from Engineering.]

Some very efficient appliances for facilitating the processes of wool scouring and dyeing have been recently brought into use at the Prospect Wool and Cloth Dyeing Works, Huddersfield, England.

The intention of Mr. Kirkham, the inventor, has been well carried out by Mr. Melling, of Rainhill, the engineer to the company, who has fitted up the machinery; and the ease and precision with which one man, or even a boy, can control all the movements that are required, while he remains quietly seated, would surprise those who have been accustomed to think that the old fashioned method of "stanging," as the hand process is technically called, is the only one that would rightly carry the wool through all its varied courses till completely dyed.

In addition to the "stanging," the usual way of operating involves much labor in the removal of the wool from pan to pan, and considerable waste of materials, as well as great loss of heat, all of which are largely rectified by the newly patented plan.

The wool during its treatment in the various liquors requires pretty continual turning over or "tossing" to insure the whole of the fibers becoming equally and uniformly impregnated, or cleansed, as the case may be, as it must not be allowed to become matted.

To do this by the ordinary "stanging" process, one or two men use a kind of pitchfork with a long and strong wooden handle, with which, and by the exertion of great force, they drag the wool up from the bottom of the pan as best they can, and stir it or toss it about in the liquor, using the handle as a lever, resting it upon the edge of the pan or vat as a fulcrum. The wear and tear shown upon the edge of the vat indicates clearly that this work is no slight matter. This work is also very trying, as the liquor is kept on the boil, by a fire below, all the time the process is being carried on.

The new engine consists of one steam cylinder, which is single acting only by steam. It is placed vertically, and is closed both top and bottom. The piston rod passes upwards through a gland in the top cover, and is attached to a heavy cast iron weight, to force the piston to make its down or suction stroke, after the steam has raised it to the top. The upward stroke, being the one by which the main work is done, is performed by the steam. The valves are actuated by very simple cam-shaped tappets, placed upon a vertical spindle, with which there is a communication from the working platform, so that by hand the position of the tappet may be varied as required. The engine is self acting when started, but is still under perfect control. It works but slowly, making three or four double strokes per minute, with about 40 pounds steam pressure. It is provided with a series of inlet and outlet passages, so that either atmospheric air, or liquor from any vat or tank with which it is in connection, may be drawn in on the downward stroke, and be delivered by the up stroke, according to the valves and passages which may be open. The valves to each are conveniently placed in a line, under the eye, and within the reach of the attendant, who can open one or more valves, as he pleases.

About 40 vats can be worked by one such engine, but in the case now under consideration there are but four scouring, dyeing, and washing vats, of wood, each 7 feet 6 inches × 6 feet × 6 feet, and three or four smaller ones, for preparing the dye liquors, the former being upon the ground floor, and the latter, placed about 6 feet higher than the others. Each of the dye vats has a cold water supply; a steam pipe and valve leading to the bottom, for boiling the liquor by steam from the boiler; a large outlet valve, by which the vat can be emptied quickly by letting the liquor run to the main drain or stream; and connection pipes to the engine. But another important fitting to these vats is a false bottom made of iron, finely perforated, which is so placed near the bottom of the vat, and there firmly held, that when air is forced into the space below it by the engine, it shall produce a certain and determined action upon the liquor, etc., which may be contained in the vat. The proper fixing of this plate has been a matter of considerable difficulty, as an imperfect action might either roll the wool into lumps, or perhaps leave the corners unmoved.

No. 1 vat is filled with water, say 1,700 gallons, and the steam is turned on to warm the water, during which time one of the workmen puts into the vat the scouring ingredients, which, according to the nature and condition of the wool, are judged to be necessary. This differs much from time to time, and needs the careful attention of the person in charge of such work, under whatever system it has to be treated. Then the engine is set to work with the air suction valve open, and the first discharge of air, which takes place on the up stroke of the piston, is passed into the bottom part of the vat, under the perforated plate, through which it rises through the whole volume of water, which it disturbs and turns about, like a wave of the sea over a rough and rocky shore. Two or three such strokes, discharging air under a pressure, as indicated by the pressure gage, of 25 pounds per square inch, serve to thoroughly mix the liquor and all the chemical substances which have been put into it. The air finds its vent naturally from the surface of the water, and has done its work. When this preparation has been made, the bale is cut open, and the wool is lifted by two men into the vat, either entire or in portions, as is most easy to them. The engine is again made to pump air into the vat, and ten or twelve strokes suffice to thoroughly shake out the wool, and drown it in the liquor, as though it were rags in a paper maker's rag engine. Steam is now admitted, and the liquor is made to boil freely till the oily character of the wool is wholly removed, by the perfect washing action imparted to the contents of the vat by the intermittent discharges of air from the engine, which, by its beautiful action, continually tosses the wool and the liquor in every direction without throwing it out of the vat. The scouring liquor thus used, is not, however, entirely exhausted of its chemical properties, and, being hot, is now allowed to run off to vat No. 2. The vats being on one level are soon equally full, and the engine is then, by a change of valves, made to draw off the liquor remaining in No. 1 vat, and to deliver it into No. 2, where it only needs to be strengthened by the addition of some fresh scouring materials; and, No. 2 vat is ready to receive a bale of wool to be treated as that in No. 1 has been; meanwhile the first bale of wool still remains where it was in No. 1 vat. It now needs washing or rinsing to free it of all the scouring materials. This is done by a rapid supply of cold water, and a pretty frequent tossing by air from the engine. When washed enough, in one or more waters, which are run off to waste, the wool is ready for the next process, which, in the operation we witnessed, was that of chroming." This chrome liquor is admitted to the vat from one of the preparing cisterns, which, are placed at the higher level, and it is diluted with water, and boiled up with steam, as the attendant sees necessary while at the same time the engine is made to toss the whole about, as in the previous parts of the work. After this "chroming" has continued its proper time, the former operation of passing the liquor to another vat is repeated, and the wool in No. 1 is left once more; this time it is ready for the logwood dye for making it black, or for any other color for which the previous process has left it fit. The dye liquor is supplied hot from its preparing cistern, as was the case with the chrome liquor, and when done with, it is in its turn also passed on to another vat, to be strengthened and used again, and so on. The wool is now ready for removal from the vat in which it was first placed, the process being complete.

There is little or no waste of heat in such an arrangement as this, and also little or no waste of dye liquor. Each quantity is passed on, from one vat to another, hot, and ready with a little help of new stuff, for repeated operations. The saving thus obtained is a very important item.

The result is, that the work can be turned out at a considerably reduced cost, notwithstanding the outlay for machinery, while at the same time a much greater uniformity of color can be produced, and with greater evenness throughout the whole batch of wool under treatment than by the ordinary method.

A special chemical action, in this system of dyeing, has much to do with the good result, arising from the extra quantity of oxygen imparted to the dye liquor from the blowing and tossing by compressed air.

This arrangement can be added without difficulty to any of the ordinary vats or pans now in use, thus rendering the application of the new system one within the reach of any person desirous of reducing the heavy hand labor of his works as far as possible.

The Manufacture of Russian Sheet Iron.

A particular kind of sheet iron is manufactured in Russia which seems not to have been produced elsewhere. It is remarkable for its smooth glossy surface, which is dark metallic gray, and not bluish gray, like that of common sheet iron. On bending it backwards and forwards with the fingers, no scale is separated as is the case with sheet iron manufactured in the ordinary way by rolling; but on folding it closely, as though it were paper, and unfolding it, small scales are detached along the line of the fold.

This sheet iron is in considerable demand in Russia for roofing, and in the United States, where it is largely used in the construction of stoves, and for encasing locomotive engines. It is there named stovepipe iron.

Russian sheet iron has been recently subjected to chemical examination in the metallurgical laboratory of the Royal School of Mines, and the analytical work has been executed by Dr. Percy's assistant, Mr. W. J. Ward.

The occurrence of a peculiar carbonaceous mass, left after the solvent action of dilute hydrochloric or sulphuric acid, may reasonably be accounted for, Dr. Percy says, by the method of manufacturing Russian sheet iron, which he describes. The sheets are interstratified with charcoal powder, and bound up in packets, each of which is subjected to repeated hammering. Hence, it is easy to conceive how fine particles of charcoal should be beaten in over both surfaces of each sheet; and, if this be so, a relatively larger proportion of carbon should exist in the thin sheet, as is the case. Yet, that some of the carbon is combined, may be inferred from the fact that distinct hardening occurs after heating the metal to redness, and immersing it while hot in water, and especially in mercury.

In the volume on iron and steel, which Dr. Percy published in 1864, he stated that the mode of manufacturing the Russian sheet iron in question was kept rigidly secret; that it was made from iron smelted and worked throughout with charcoal as the fuel; that, according to information which he had received from three independent sources, the sheets, after the completion of the rolling, were hammered in packets, with charcoal dust interposed between every sheet; and that they were subsequently assorted, and the outer ones, being inferior in quality, were thrown aside as wasters.

Our author has since found that the secrecy was more dependent on ignorance of the Russian language than on anything intentional; and he now gives various particulars of the process.

The manufacture of sheet iron in Russia, he says, is chiefly confined to the iron works on the eastern side of the Oural Mountains. The malleable iron, which is the subject of this manufacture, is derived from pig iron, obtained by smelting the following ores with charcoal in cold blast furnaces—namely, magnetine, carbonate of iron (*sphæro siderite*), and red and brown hematite. The conversion of the pig iron into malleable iron is effected either in the charcoal finery or in the puddling furnace.

The puddle balls, intended for the manufacture of sheet iron, are rolled into bars five inches wide and half an inch thick. The iron should be more crystalline than fibrous, and should contain sufficient carbon to render it more like steel than iron. The machinery required consists of one or two pairs of rolls and two kinds of hammers. Reheating is conducted in furnaces of particular construction. The rolls are driven by water wheels, and should make not fewer than fifty revolutions a minute. The hammers are also put in motion by cams on the axles of water wheels, The hammer heads are of wrought iron, with striking faces of steel. Each anvil consists of a solid block of white cast iron. It is necessary that the hammers and anvils should be so made, in order that they may have the requisite hardness, in default of which the surfaces of the sheets would not acquire sufficient brightness or polish.

The puddle bars, five inches wide and one fourth of an inch thick, are cut into pieces twenty-nine inches long, which weigh about 15·35 pounds avoird. (10 pounds?—J. P.). These pieces are heated to redness, and cross rolled into sheets about twenty-nine inches square, and in order to become thus extended, they require to be passed through the rolls about twelve or fourteen times. The sheets thus produced are arranged in packets of three in each, heated to redness, and rolled, each packet passing through the rolls about ten times. But just before rolling, the surface of each packet is cleaned with a wet broom, usually made of the green leaves of the silver fir, and powdered charcoal is strewn between the sheets.

The sheets obtained from this rolling are sheared to the dimensions of twenty-eight inches by fifty-six inches. Each sheared sheet is brushed all over with a mixture of birch charcoal powder and water, and then dried. The sheets, so coated with a thin layer of charcoal powder, are arranged in packets containing from seventy to a hundred sheets each; and each packet is bound up in waste sheets, of which two are placed at the top and two at the bottom. A single packet at a time is reheated, with logs of wood about seven feet long placed round it, the object of which is to avoid, as far as possible, the presence of free oxygen in the reheating chamber. The gases and vapors evolved from heated wood contain combustible matter, which would tend to protect the sheets from oxidation in the event of free oxygen finding its way into the reheating chamber.

The packet is heated slowly during five or six hours, after which it is taken out by means of large tongs and hammered. The packet is moved about so that the blows fall in a certain regular order. After this treatment the surface of the packet presents a wavy appearance, as the striking face of the hammer and the face of the anvil are both rather narrow. When the packet has traveled about six times under the hammer, in the manner specified, it is removed; and immediately afterwards, completely finished sheets are arranged alternately between those of the packet.

The actual cost of manufacturing these Russian sheets is about £12 15s. per tun, to which must be added general charges, which raise the amount to £16 or £17 per tun, exclusive of profit. The average price of sheet iron at the fair of Nijni-Novgorod is about £22 or £25 per tun.

Moving in Circles.

It is astonishing how some people move in a circle, and run round and round in the well worn ruts, without attempting to widen the one or step out of the other. They do things in a certain way because some friend or neighbor does so, without a question as to the propriety or fitness of their doing the same thing in the same way, whether the circumstances admit of it or not. We were forcibly impressed with this, not long since, while stopping a few hours in a flourishing town in one of the finest counties in Central Ohio.

On a fine broad street, there were no less than five or six residences, mostly on contiguous lots, built as nearly alike as possible, with the front door in each, in some unaccountable way, set obliquely into a corner at the end of a balcony running along the side of the main building, making a row of singularly awkward looking dwellings, and sadly marring the beauty of the street architecture.

Another case in point is that of a man now building a two story and basement house on a twenty foot lot. His heart is set on a "swell front," not because he admires the style, or that it is at all adapted to so narrow a house, but because his friends have built on that plan, and he does not wish to be singular. It is in vain the architect has assured him that a swell front—which we never see on a house too narrow for it without calling to mind a character in "Little Dorrit" who, as Dickens tells us, "was not so much a man as a sort of swelled boy"—will give to a house of that width a cramped look, and make it seem even narrower than it is, that a front of this style for a building not wide enough to accomodate it, savors of affectation, and is in bad taste. It is all in vain; the foundation is laid and the work goes on. The precedent has been established by one of his neighbors, and will be followed in more than this single instance by others who cannot be prevailed on to give up the cherished ambition of an "imposing swell front."—*Building News.*

A FORM of stereoscope, in which mirrors were used to produce the effect, was devised by Wheatstone, in 1838; but the stereoscope now used was invented by Sir David Brewster, in 1849. The former was known as the reflecting stereoscope; and the latter, in which lenses take the place of mirrors, is called the refracting or lenticular stereoscope.

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Improved Pressure Recorder.

An instrument that will record the pressure in steam boilers, gasometers, etc., and indicate it so that such pressure may be referred to the exact time at which it occurs, is one that, in our opinion, ought to form an adjunct to every steam boiler in use. Such an instrument would definitely settle the disputes as to whether boilers explode under undue pressure, or not, and would furnish legal evidence, that in many cases would be invaluable, in determining the negligence of boiler attendants.

The instrument shown in our engraving, Fig. 1, is a recording pressure steam gage. The pressure is received upon a diaphragm in the chamber, *a*, through the inlet, *c*. The diaphragm transmits motion through a sliding rod to the index finger, *b*, which moves a pencil point to or from the center of an annular ruled disk or card, the inner edge of which is numbered like the dial of a clock.

The dark lines, curving from the center of the card outward, towards its perimeter, separate the surface into divisions corresponding to hours on the dial; and the lighter lines between them, running in the same direction, indicate ten minute divisions.

The concentric lines indicate pressure in pounds, from nothing at the outer edge of the card, toward the center.

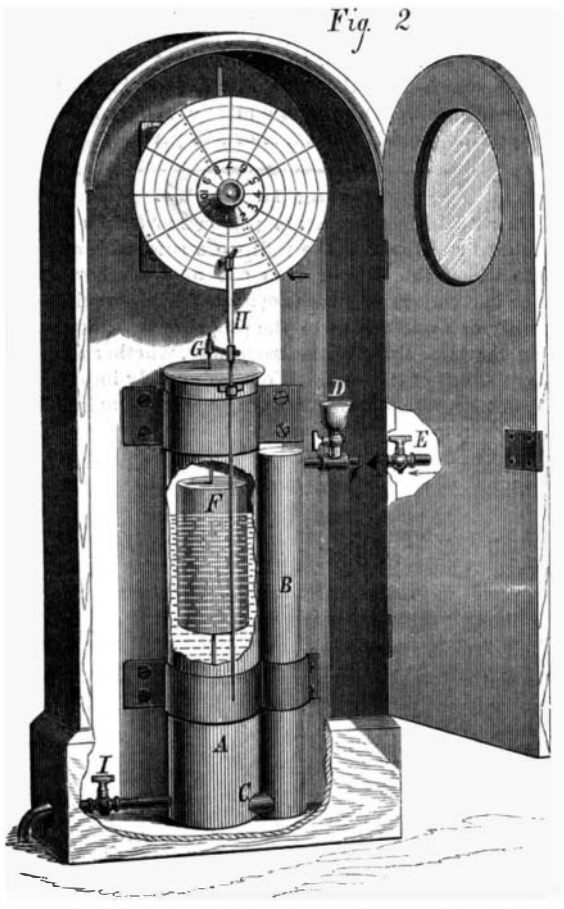
The card being revolved by clockwork, the pencil point, in the extremity of the index finger, makes a tracing on the card, showing the precise pressure indicated at any hour or minute of the day.

Fig. 2 is a modification of the instrument, designed to indicate the pressure of gas.

A cylinder, A, communicates with the cylinder, B, through a short pipe, C. Water is put into these cylinders through the funnel, D. The pressure of the gas is transmitted, through E, to the surface of the water in B, and causes the water in A to rise, carrying upward a float, F. From the top of a stem, attached to the float, F, projects an arm, G, which arm moves, upward or downward, the slender rod, H. The rod, H, carries a pencil point, which gives the tracing on the card.

The card is ruled with straight radial lines, instead of curved ones, as on the steam gage, Fig. 1, as the pencil point moves in a straight line instead of a curved one.

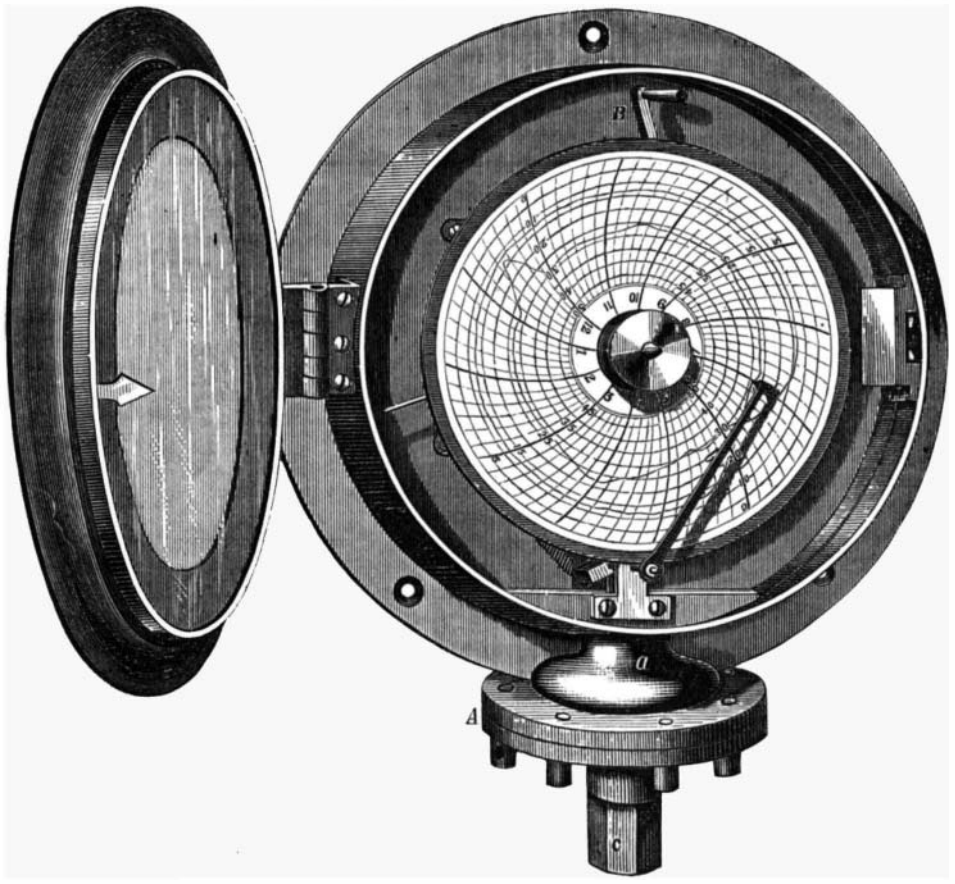
These instruments are simple, and are, no doubt, reliable. We consider their indications more valuable than those of instruments which simply trace a curve of pressure, without referring the variations from the established standard to the times at which they occurred.



For further information address D. P. Davis, 44 Courtland street, New York.

Reconstructing Old Dwelling Houses.

It is a common remark with those who have repaired an old dwelling house, that it costs more to reconstruct an old house than to build a new one. In some instances the saying is true, while in others it is not. The expense will depend on the sound or unsound condition of the old structure, the alterations to be made, and the management of the proprietor and the builders. In some instances, the structure to be rejuvenated is so different from what is desired, that the most economical course will be to tear the old building down at once, or remove it and appropriate it to some other purpose. If, for example, the siding and roof are old and must be renewed; if the rooms are not of the desired hight and size; if some of the timber has decayed, and the studs and joists are so far apart that the laths will spring between the timbers to which they are nailed, and thus fail to make a strong wall,—the old dwelling had better be demolished, as a new edifice can be erected more economically than such a shell can be satisfactorily reconstructed. On the contrary, if the frame is sound and the rooms of the desired form, new siding, new windows, new doors, and new walls can be substituted for the old ones much more economically than the old frame can be demolished and a new structure erected.



DAVIS' PRESSURE RECORDER.

There are two ways of repairing an old dwelling, one of which is expensive and unsatisfactory, and the other is satisfactory and economical. The expensive way is to let a builder take the job by contract, and agree in writing to do this and that as per contract. Of course, every professional builder knows enough to make an estimate that will cover all expenses and leave him a generous profit. Whenever a contract is drawn, builders are not always careful to note every minor item; and proprietors do not always think of every little job until it is too late to be noted in the contract. Such things cause difficulty. The builder of one of the college edifices of Cornell University was not obliged to make box window frames, and provide weights for the windows, as that particular item was not specified in the contract. So the building was finished without window-weights, as such appliances had not been thought of by the directors until the building was nearly finished.

The most economical way to repair an old dwelling is to employ a faithful and competent joiner to prepare a bill of such materials as will be required, and to do the work by the day. It may be well, also, to provide one or more assistants or helpers; but let the proprietor bear in mind, that, as the number of workmen is multiplied,—unless the superintendent is a judicious manager,—the expense will be augmented. As a rule, it is true that four men, working together at such labor as one man can do, will not acccomplish as much in one day as one man alone will do in four days. First, then, let a thorough examination be made of the structure, and let every alteration be plainly noted on paper, after which let a bill of items be carefully made out. For example, one or two sides of the dwelling will require residing. Estimate the number of feet, or the pieces required of a given length and width. If a box cornice or bracket-cornice is desired, let a correct estimate be made of every board, molding facia, bracket lintel, etc. If a verandah is to be erected, make a note of every piece of timber, cornice, flooring, and roofing; after which, let every article be brought on the ground, and the lumber stuck up or spread out in the sun to dry. One great fault in building is using lumber that is is only half seasoned. If lumber that has been sawn a year, or even four years, is spread out in the hot sun for a few weeks, it will shrink but little after being worked up in finishing a dwelling house. Floor boards in particular should be spread out at least four weeks on slabs or timber to keep to keep the ends off the damp ground; and every day they should be examined to see if they do not warp. The rounding or convex side should always be kept up. Clapboards should always be thoroughly seasoned before they are nailed in their places; as boards partially seasoned, when nailed at both edges as clapboards are secured will usually split during the seasoning process, and thus form damaging and unsightly cracks. As soon as the lumber is sufficiently dry, let every piece be dressed out ready for use; then strip one side of the structure, erect the verandah, put up the cornice, nail on the siding, and let the paint brush follow the hammer in close succession before newly dressed lumber will have a chance to get wet. By adopting such a plan,—"getting a good ready," and knowing what is to be done,—the expense, of repairing an old house, will be much lighter than if the various operations were conducted in a hap-hazard manner.—*Technologist*.

McKenzie's Improved Carriage Top.

In the construction of these improved mechanical arrangements applicable to carriage heads, which are made to open and close—such as the landau—the ordinary outside carriage head joint or jointed support is used, although in some cases dispensed with, this joint having, however, by preference, an action the reverse of that usually adopted; that is to say, the upper end is attached to a turning axis, which works on the pillar top or equivalent part of the carriage. To this axis lever teeth or other gearing is secured, which gearing is also connected to the cant rail, hoop stick, or equivalent, and likewise to a spiral or other convenient spring made of india rubber or other suitable material, the lower end of which spring is secured to the lower part of the pillar top. These parts can all be covered. The other end of the outside carriage head joint is provided with the same arrangement of gearing and spring, either in addition to or substitution for that at the top end.

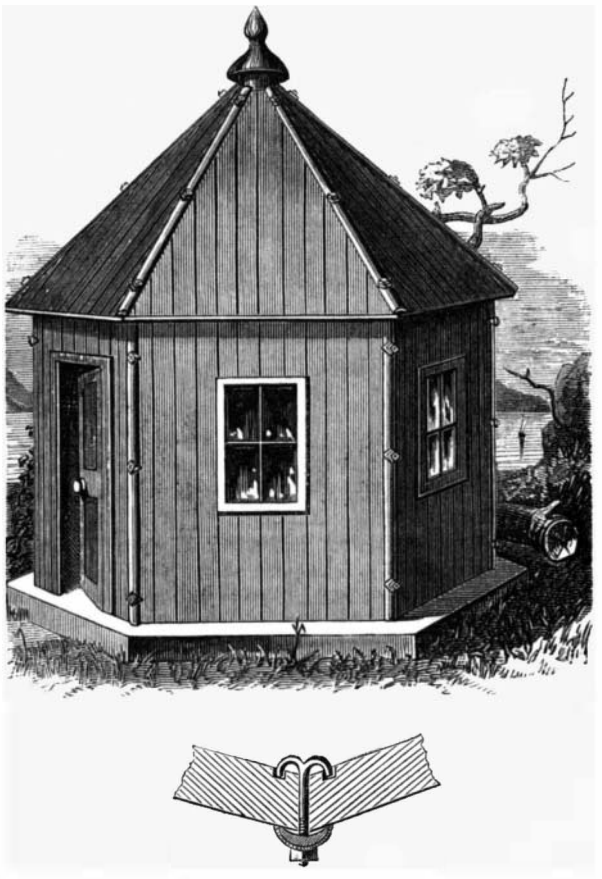
Ropes or chains and pulleys may be used to enable the head to be raised or lowered, or opened and closed, from the coachman's or traveler's seat. The opening and shutting or raising and lowering are effected without handling the jointed supports, as is necessary in the ordinary arrangements, by pushing or pulling the head in the usual way, except when the ropes and chains are used, when it may be effected by acting on them; but this will cause the carriage head joint or support to strike outward and not inward, as generally is the case; hence, when the carriage head has to be raised, it can be much more easily effected than by the ordinary arrangements.

Where carriage heads have side lights which can be slid along and dropped into the door, or otherwise removed out of the way when raising or lowering the head—such, for instance, as are sometimes adopted for the fore half of the carriage—modifications can be adapted and applied so as to dispense with the outside joint or jointed support, and, by covering all the mechanism, keep the same entirely out of view.

Mr. Alexander McKenzie, of Westminster, England, is the inventor of this improvement.

BAIN'S PORTABLE BUILDINGS.

The building shown in our engraving is intended for a



dwelling in the case of persons moving from one place to another not far distant—as laborers on railroad bridges, excavations, etc., are often required to remove. It is also intended for outbuildings for farmers, and especially tenants on farms. It is suitable for barns, stables, tool sheds, shops, granaries, smoke houses, and chicken coops; in short, for any purpose for which outbuildings are needed.

The buildings are constructed of boards or planks in side, and roof sections of any desired number, to suit the size of the building required. These sections are joined together to form the proper angles, and fastened in such manner as to obviate the necessity of framework or corner posts. The fastenings used are the same in the various sizes, and allow

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