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Contents:

(Illustrated articles are marked with an asterisk.)

GLAZED BRICKS FOR BUILDING PURPOSES.

An article on the "Materials for Economic Building" which appeared in the London *Builder* of Feb. 5, contained a suggestion that for interior walls, and indeed for surfaces exposed to weather, one end and one side of the bricks should be covered with a vitreous glaze.

The suggestion is, in our opinion, an excellent one, and worthy earnest consideration. Not only might increased durability be thus secured without the use of paint, but ornamental effects of the highest order might easily be obtained.

The article in the *Builder* has called forth an interesting correspondence upon the subject, from which it appears that the plan proposed by that journal, namely, the glazing of walls after their construction, by the use of a heated iron plate to fuse the coating of glazing material previously applied, has in it many elements of impracticability.

It is argued that difficulty would be experienced in laying on the glazing material with a brush, where colors had been previously employed for ornamentation, without at the same time disturbing the colors; and that if a glaze sufficiently hard to resist the action of the weather be used it would be impossible to fuse it in the manner proposed. A better way would be to lay the glazing material upon half burned bricks, and complete the burning in a muffled kiln; that is, a kiln with a lining of thin fire-clay, to protect the surfaces of the bricks from dust.

The half-burnt bricks will take color well when it is desired to ornament them. In this case it is suggested that the half-burnt bricks be laid in a wall in the position they are to occupy when put in buildings, and the design painted upon them, after which they are to be taken down and burned as above stated.

It is thought that in this way impervious walls of a highly decorative order might be obtained, and we fail to see any impracticability in the plan. In fact, one of the correspondents of the *Builder* states that he has glazed several common bricks, in imitation of the old Assyrian and Babylonian bricks to be seen in the Museum of Geology, in Jermyn street, London, with perfect success; not only making the bricks non-absorbent, but imitating the colors of the ancient specimens referred to. He also states that he has had perfect success in painting designs and burning them in, and that he is convinced common bricks can be thus glazed at a moderate cost. He also has succeeded in glazing bricks and retaining their bright red color, and states that the bricks thus produced would make highly ornamental interior walls, without the use of plaster, paper, or paint.

A great collateral advantage in the use of such bricks for outside walls, aside from the fact that they need not be painted to render them impervious, is, that their surfaces would be cleaned by every fall of rain, and would therefore always look fresh and bright.

There is no doubt that the prevailing monotony of bricks and mortar, which now pervades many of our American cities, might be greatly enlivened and relieved by the introduction of glazed and ornamented bricks for fronts. What architect will be the first to carry out the idea in this country?

DUALIN---WHAT IS CLAIMED FOR IT.

We are in receipt of a letter from Mr. Carl Dittmar, the inventor of dualin, who, while admitting the spirit of fairness shown in our recent article upon this explosive, sets forth its claims more fully than we were able to do at the time that article was written. We gathered our information from various sources, which we supposed to be reliable, yet Mr. Dittmar states that our showing does not do full justice to the merits of his invention.

While we have not room to publish Mr. Dittmar's communication at length, we will give the substance of it in the present article, and will add that there can be no doubt that if these claims are established, a valuable addition to the list of explosive agents has been made. The inventor expresses his willingness to submit his powder to any and all proper tests and to rest the validity of his claims upon the results.

He claims that dualin is safer than common powder, fully as strong as nitro-glycerin, and cheaper in its application than either, and he asserts that the use of the preparation in Central Europe has proved these claims to be valid.

What will, perhaps, take our readers most by surprise, is the fact that Mr. Dittmar claims to have been the original inventor of dynamite. He says:

"Mr. Alfred Nobel has patented this invention, he has even disposed of the patent right he held for it in this country, yet he is by no means the inventor of dynamite, which I did invent and bring first to Mr. Nobel's notice. I held at that time the position of technical director of the first nitro-glycerin manufactory which Mr. Nobel had ever established in Germany."

It seems strange that Mr. Nobel should have been so universally acknowledged as the inventor of dynamite, or giant powder, if the statements of Mr. Dittmar are correct. Upon the merits of this part of the subject, we cannot, of course, pretend to decide; but we have no doubt Mr. Dittmar is amply qualified to judge of the advantages as well as the disadvantages of dynamite, or giant powder.

He admits that dynamite is a great improvement on nitroglycerin, but enumerates the well-known inconveniences met with in its use, such as the generation of deleterious gases in mines, its inexplosiveness at low temperatures, the necessity of using an exploder to fire it, etc., etc.

He denies that dualin will explode when brought in contact with flame, unless it is confined in a well-tamped blast-hole, shell, or its equivalent, and he sends us a paragraph from the North Adams *Transcript*, which details an experiment performed with it in front of the Wilson hotel in that town, in which a cartridge of it was set on fire in the road in front of the hotel, without explosion and with effects and appearance resembling a Roman candle when ignited.

He states, moreover, that dualin will explode when wet, notwithstanding what has been said to the contrary, and that he uses and recommends water tamping in preference to all others. As proof of this he instances experiments in Hoosac Tunnel, where seven pound cartridges made of common paper, were placed in blast-holes not only filled with water, but two feet under the surface.

He further asserts that dualin has been found to be at least 30 per cent stronger than dynamite in European experiments, and that "iron plates, 16 inches and 23 inches thick, on which a dynamite explosion would produce no effect whatever, were rent into fragments by the explosion of a quantity of dualin of less weight than the quantity of dynamite used."

If these statements shall be verified by experience, Mr. Dittmar will certainly lose nothing by permitting his powder to be tested anywhere fairly upon its merits, and he expresses his entire readiness to permit such trials, and to abide by their results.

NATURE'S ELEVATOR.

"What goes up must come down," we boys used to sing in one of our youthful games. The converse, what comes down must have gone up, or have been forced up, leads to the consideration of some of the most stupendous operations of nature.

On all hands we may see these operations proceeding in silent grandeur. Masses of matter, which, aggregated, become almost inconceivable in magnitude, are constantly moved upward from the earth's surface, to descend in due time; again to be raised and again to fall. So the ponderous engine of nature oscillates constantly, without faltering, yet it moves so quietly and with so little friction, that only occasionally, when the thunder shakes the earth, or the hurricane ravages the land and sea, do we note the tremendous power of the common natural forces, which, in the calm summer day or the winter's storm, are always at work about us.

The water constantly accumulating in the air descends and fills the rivers. We see, and wonder at the aggregated power of these torrents as they impetuously rush toward the sea, leaping precipices and sweeping every obstacle before them; but we do not realize the great truth that all the while the silent force of solar heat is transporting to the clouds as much water as the rivers are carrying down.

We stand by some mountain side whose forests are being felled and transported to the valleys, without reflecting that all this vast mass of material was carried up, molecule by molecule, in the atmosphere and in the sap, until its accumulation became so great as to be demanded for the uses of mankind.

The unseen power that does all this work is solar heat. "Where there is life there is heat," and it would seem that heat is essential to all life. At least we cannot conceive of life without heat; and so intimately connected are heat and mass motion that it is difficult to conceive of them as other than co-existent.

Heat is the great prime mover, all else is secondary in natural as well as artificial mechanics. Does falling water turn our wheels? Heat raised the water first. Does wood or coal generate our steam? Solar heat stored up the carbon which constitutes the bulk of that fuel, and set the rivers running and the winds blowing, by which we transport it to our furnaces. Do we employ animals to carry our burdens? The food which nourishes them and enables them to perform labor, was collected by the action of the solar heat.

We find then, all life, all motion, all work traceable to the power of solar heat. This is the great mechanical engine employed by nature to keep everything running. To-day bold inventors are endeavoring to bring this heat into direct subjection, as a motor, but should they succeed, so that coal, wood, peat, or other fuel should no longer be needed to impel machinery, they will only have eliminated a few terms of the great mechanical equation. It is the sun that does the work on the water-wheel and in the steam boiler, as truly as in Ericsson's solar engine.

And in the present state of science there is little doubt, that not only mechanical energy, but every other form of terrestrial energy included in the category of force, may be ultimately traced to the sun as its source. The sun is, in this view, the great central motor of the solar system. From whence it derives its power, what constantly maintains its heat, is one of the grandest problems science has ever grappled with, and one which is not yet solved.

THE MEASUREMENT OF WATER POWER.

This is one of the most simple operations in hydraulic engineering, so far as fundamental principles are concerned. In fact one proposition comprises the whole subject. The weight of water discharged per minute, multiplied into the "head" or the number of feet through which the water is to be applied to work—or, as it is more often termed. "the fall"—gives the power of the flow in units of work, 33,000 of which constitute the conventional horse-power.

Notwithstanding the simplicity of this proposition, considerable care and skill are requisite to avoid errors in practice. The measurement of the volume of an open running stream, although much more simple than the measurement of the flow of liquids through pipes is still a matter of some nicety.

The usual method is the use of the weir, and as this can easily be made and used by any person of medium mechanical skill, we will describe its most approved form and the manner of using it.

The weir is a plate of thin iron with a retangular notch cut out of it calculated to a width sufficient to carry the water to be measured with a moderate depth of stream over the weir. The bottom of the notch must be set level, and this may be conveniently performed by a plumb line attached to an upright, attached to one end of the weir at right angles to the bottom of the notch.

The depth of overfall is measured from the top of a stake, set back of the weir to such a distance that the depression which takes place in the water as it approaches the weir, will be wholly avoided. The top of the stake is made flat, and a common rule may be used to measure the depth of the stream passing over the stake. The proper placing of this stake is a matter of importance, for if it is not set far enough back the measurement cannot be relied upon.

The amount of water flowing per minute over a weir of this kind may be found by multiplying the mean depth over the top of the stake in inches into the square root of the mean depth, and this product by 22·2437. This will give the flow in pounds per minute. The final product multiplied by the fall in feet will give the flow in foot-pounds per minute, which, divided by 33,000, will give the horse-power for each inch in width of the weir; and this multiplied by the width of the weir in inches will give the total horse-power.

The total horse-power, multiplied by the percentage of useful work known to be developed by the wheel it is desired to employ, will give the actual working horse-power that can be obtained from the stream by the use of that wheel.

We append a table from Box's "Practical Hydraulics," giving the amount of flow over a weir one inch in width for various depths over the head of the stake in gallons. To find the flow in pounds for any width of weir and for any depth given in the table, multiply the flow given for that depth by the width of the weir in inches, and that product by 8·331. We would not in making a test employ an overflow of over 18 or 20 inches for ordinary sized streams; but for very large streams; it might be necessary to use a weir of greater capacity.

TABLE OF THE DISCHARGE OF WATER OVER WEIRS, ONE INCH WIDE IN GALLONS PER MINUTE.

Depth.	Galls.	Depth.	Galls.	Depth.	Galls.	Depth.	Galls.	Depth.	Galls.	Depth.	Galls.
In.		In.		In.		In.		In.		In.	
¼	·3338	4⅛	22·37	10	84·43	33	506·1	64	1367	95	2472
⅜	·6132	4¼	23·39	10½	90·84	34	529·3	65	1399	96	2512
½	·944	4⅜	24·38	11	97·41	35	552·8	66	1432	97	2551
⅝	1·329	4½	25·49	11½	104·1	36	576·7	67	1464	98	2590
¾	1·734	4⅝	26·56	12	111·0	37	600·9	68	1497	99	2630
⅞	2·185	4¾	27·64	12½	118·0	38	625·4	69	1531	100	2670
1	2·670	4⅞	28·74	13	125·1	39	650·4	70	1564	101	2711
1⅛	3·185	5	29·85	13½	132·5	40	675·5	71	1597	102	2751
1¼	3·818	5⅛	30·97	14	139·8	41	700·9	72	1631	103	2791
1⅜	4·305	5¼	32·12	14½	147·4	42	726·7	73	1665	104	2825
1½	4·905	5⅜	33·26	15	155·1	43	752·9	74	1700	105	2873
1⅝	5·531	5½	34·44	15½	163·0	44	779·3	75	1734	106	2914
1¾	6·167	5⅝	35·62	16	170·9	45	806·0	76	1769	107	2955
1⅞	6·855	5¾	36·85	16½	179·0	46	832·8	77	1804	108	2997
2	7·552	5⅞	38·02	17	187·1	47	860·3	78	1839	109	3039
2⅛	8·271	6	39·24	17½	195·5	48	887·9	79	1875	110	3080
2¼	9·011	6¼	41·72	18	203·9	49	915·8	80	1910	111	3122
2⅜	9·773	6½	44·25	19	221·1	50	944·0	81	1946	112	3165
2½	10·55	6¾	46·82	20	238·8	51	972·4	82	1983	113	3207
2⅝	11·36	7	49·45	21	256·9	52	1001	83	2019	114	3250
2¾	12·18	7¼	52·12	22	275·5	53	1030	84	2056	115	3293
2⅞	13·02	7½	54·84	23	294·4	54	1060	85	2093	116	3336
3	13·87	7¾	57·61	24	313·9	55	1089	86	2130	117	3379
3⅛	14·75	8	60·41	25	833·8	56	1119	87	2162	118	3422
3¼	15·64	8¼	62·54	26	354·0	57	1149	88	2204	119	3466
3⅜	16·55	8½	66·17	27	374·6	58	1179	89	2242	120	3510
3½	17·48	8¾	69·11	28	395·6	59	1210	90	2280		
3⅝	18·42	9	72·09	29	417·0	60	1241	91	2318		
3¾	19·39	9¼	75·12	30	438·7	61	1272	92	2356		
3⅞	20·37	9½	78·18	31	460·8	62	1304	93	2395		
4	21·36	9¾	81·29	32	483·3	63	1335	94	2433		