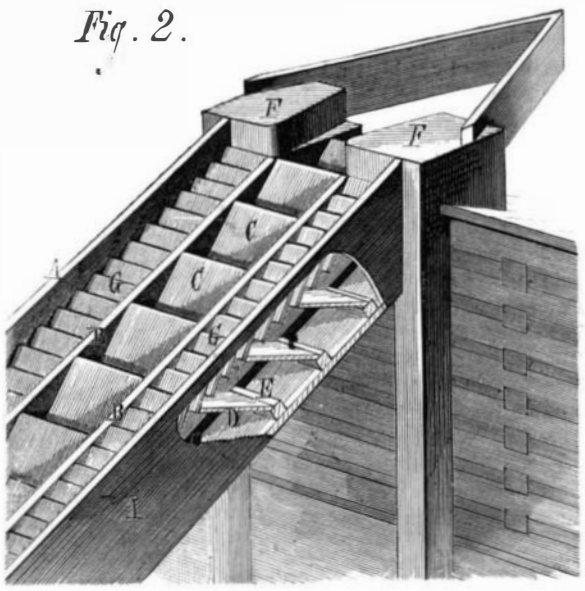
A NEW FISH WAY.

To provide a practicable passage for fish over dams or other obstructions, a current of water must be conducted from the upper level to the lower, with such velocity that fish may readily swim it, and under such conditions that they may readily find it.

Heretofore this has been accomplished in one of two ways. Either the total fall to be overcome has been broken into a succession of falls, connected by pools, as is common in the salmon ladders of Europe, or, second, the water is compelled to traverse a tortuous path down a flat incline—the tendency to increased velocity being controlled by the friction produced by the incessant changes of direction.

The greatest slope allowable for dams of any height is about one foot in twelve, and the length of the water way

Fig. 2.



McDONALD'S FISH WAY.

being about three times the length of the incline, it follows that fish, to overcome a fall of one foot, must swim a distance of thirty or forty feet, with continual changes of direction, and at every turn encountering baffling swirls or eddies.

In the fish way here illustrated and described the water is delivered down a straight sluice way having an inclination of one in three; on either side the water is banked with a slight upward and inward impulse, while down the center a current flows with uniform motion, being no faster at the foot of the way than it is at the top. The velocity of the central current may be regulated to four, three, or two miles an hour, as may be desired. The simple device by which these marvelous results are obtained will be readily understood by a careful study of the accompanying engravings.

Fig. 1 is a perspective view of the way as it appears when in operation. It is represented as built of timber, attached to a crib dam, and anchored to a rock bottom by means of iron rods. The intervening supports may be piles, as in the engravings, stone cribs, or trestles. The builder will determine the best modes of securing according to the circumstances of the particular case. At the head of the way is shown a V-shaped guard of timber, the lower edge of which is a few inches below the level of the crest of the dam. This will deflect the light floating material (sticks, leaves, etc.) and prevent any interference with the working of the way.

Fig. 2 is a perspective view of the upper portion of the way, with the side broken away to show the internal construction. Fig. 3 is a sectional view of the same.

The course of the water in the way is shown by the arrows. This fish way, when made in its simplest form, is a rectangular timber trough, two feet wide and two feet deep, inside dimensions. One end of the trough rests against the crest of the dam, the other in the pool below. The trough is firmly secured to the dam and to the bottom, and supported at intermediate points if necessary. Transverse cleats, E, three inches high, at intervals of twelve inches, are nailed to the bottom of the trough. The stringers, B, rest upon the cleats, dividing the trough into three longitudinal compartments, the middle one being twelve inches wide, the lateral compartments being five and a half inches each. The stringers are one inch boards, ten or twelve inches, set on edge. The middle section of the way is divided by the inclined portions or buckets, C, into a series of compartments, as shown in Figs. 2 and 3. The lateral sections are similarly divided by partitions or buckets, D, inclined in a reverse direction, into a series of compartments, communicating below by the openings between the cleats, E, with the corresponding middle compartments. The division of the lateral longitudinal compartments is completed by the series of directing plates, G. The water is brought into the way through a notch or sluice in the dam, two feet wide and six inches deep, and the interior hollow floor of the way is beveled off level with the bottom of the sluice way through the dam. The shoulder blocks, F, prevent the water from the dam overriding the lateral banked eddy water.

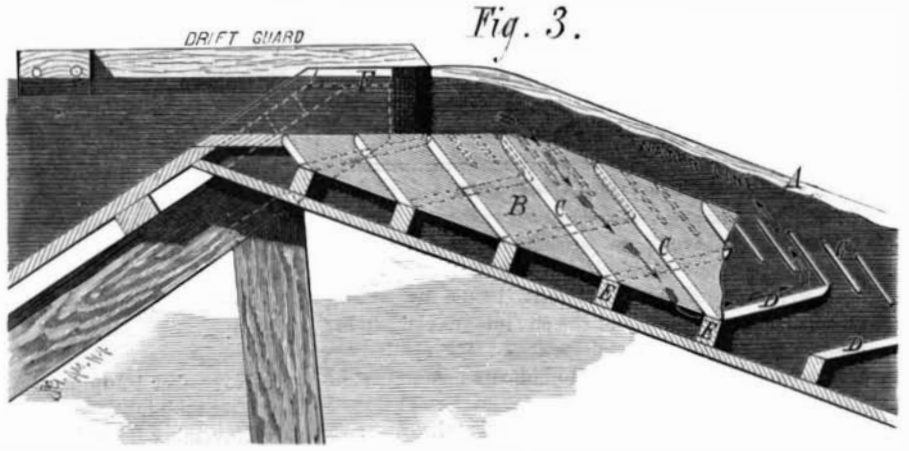
The water passing through the sluice from the dam tends to continually sink in the middle line of buckets and emerge at the sides at a lower; level the difference of head and the directing plates, G, causes it to bank up on the sides and feed back to the middle of the way. The sinking in the middle is compensated in this way, and a constant depth and constant velocity is maintained from the top to the bottom of the way.

Mr. McDonald, the patentee of this way, claims that it delivers the water down a straight sluice, and under such conditions as closely to simulate the natural flow, and that the moderate velocity of descent offers no impediment to the ascent of the most sluggish fish. It may be built on a slope of one in three, or even greater, and it need not be wider than the water way, and does not require a great amount of material in its construction. It may be adapted to any water supply, and for a given capacity secures the greatest economy in the use of water. For our small streams, to pass alewives, etc., it may be roughly built of boards, with saw and hammer, at a low cost, or it may be expanded so as to throw the entire volume of a river through it.

From its compactness and lying so close under the dam, it possesses greater immunity from freshets, and can be protected with less cost than other ways.

This fish way has been adopted by the Board of Public Works of Virginia, and its erection made obligatory on all dams in the State. Mr. Marshall McDonald, of Lexington, Va., the patentee of the way, is the Fish Commissioner for the State of Virginia.

Fig. 3.



LONGITUDINAL SECTION OF FISH WAY.

A PARIS review of the sugar trade says: "Beets are worse than was expected from the appearance of the growing crops, but the amount of the deficit cannot yet be estimated.

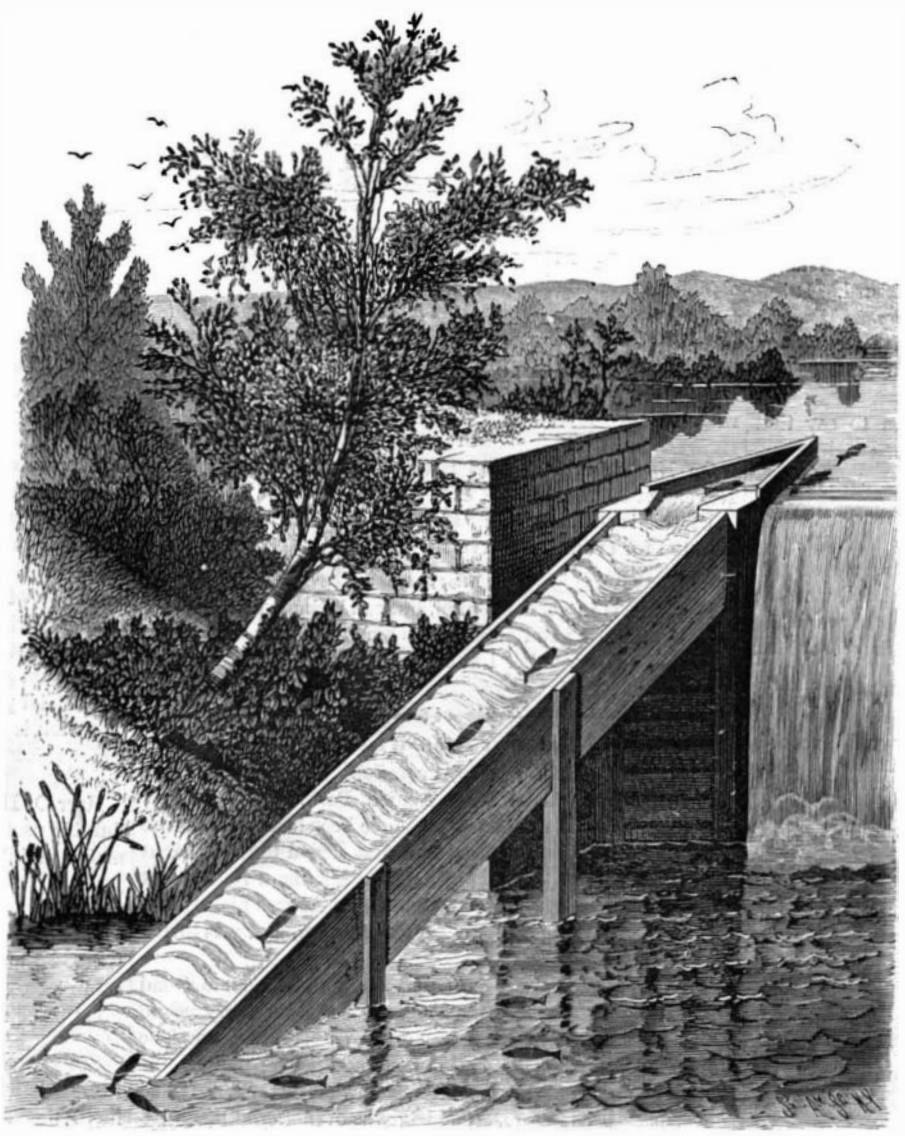


FIG. 1.—McDONALD'S FISH WAY.

MISCELLANEOUS INVENTIONS.

An improved bale tie, patented by Mr. Robert G. Stewart, of Augusta, Ga., consists of a cast buckle having three openings or band slots, of which the central opening is longer than the side openings, and communicates through a tapering throat with one of the side openings, and in which also the side openings are formed in a portion of the buckle which dips downwardly at a sharp angle into a different plane from the main central portion of the buckle, the buckle being designed to be used with a band whose bent ends occupy a position around the bars of the middle section, while the free ends of the band pass above the outer sections of the buckle, so that they are held by a positive bearing surface without depending upon the expansion of the bale for holding it.

Mr. William Mather, of Salford, county of Lancaster, England, has patented an improvement in apparatus for damping woven fabrics by means of a spray or sprinkling of water upon the fabric after starching or stiffening. It consists of a damping roller made of metal, with an engraved surface. The damping roller revolves in a trough containing the water, and a doctor, of India rubber or other suitable material, is applied to the damping roller to remove the excess of moisture. The fabric or other material is pressed against the damping roller by a roller supported in a swing frame.

Mr. William P. Gilmer, of Mount Airy, N. C., has patented improvements in clamps for holding the boxes under the plunger of presses for compressing plug tobacco in the boxes. The object of the invention is to enable boxes of different sizes to be clamped and held securely under the plunger and in the proper position relative thereto.

Mr. William J. Taber, of Lookout Station, Wyoming Ter., has patented an improved trap for catching bears, wolves, and other animals. The invention consists in the combination of four curved spring bars provided with hooks and a trigger, and catches. The trap is hung upon a tree, stake, or bush, so that the bait will be within reach of the animal to be caught. Dogs, wolves, bears, and many other animals will seize a piece of flesh with their jaws and bolt it down. This operates the trigger and releases the spring hooks.

An improved combined filter and supply pipe has been patented by Mr. James Gainey, of Augusta, Ga. The invention relates to improvements in the arrangement of a filter in connection with the supply pipe of a house. It consists in combining a filter with a three-way cock by means of connecting pipes, so that filtered or unfiltered water may be drawn from the same locality and at any part of the house.

Mr. Sylvanus B. Crane, of Davenport, Iowa, has patented an improved electrical passenger recorder, designed to register all of the passengers of a railway car, whether sitting upon the seats, standing between seats, sitting on the arm rests, standing in the aisle, or standing upon the steps outside of the car, and it operates upon the general principle of closing an electric circuit by the depression of the support upon which the passenger may be sitting or standing.

Mr. James Gardiner, of Mantua, N. J., has patented an improvement in the class of portable apparatus used in scalding swine. It consists of a tub or boiler having appliances for raising and lowering the carcasses of swine, and a furnace or fire box on which the tub rests.

A paper bag machine, patented by Mr. Otis E. Davidson, of Clarksville, Tenn., is an improvement in the class of machines adapted to form satchel-bottomed bags having a single lengthwise seam or lap. The invention consists in novel mechanism for feeding and pasting, and also creasing, the continuous web of paper,

and for cutting off blanks therefrom, and folding, pasting, pressing the latter, and discharging them from the machine as completed bags

Mr Samuel M. Eddy, of Dalton, Ga., has patented a simple, easily operated, and efficient apparatus for washing gold from the dirt, stones, etc., with which it is mingled. It consists of a rectangular trough provided with gates, bars, or bridges, intervening pockets, and zigzag ribs or bars, for obstructing the material and supplying places for receiving and retaining the precious metal as it gravitates from the gold bearing dirt or sand.

An improved automatic car brake, patented by Mr. Cooley M. Wilkins, of Ashtabula, O., is an improvement upon that general form of car brake in which a longitudinal bar runs the full length of the car beneath the same, and terminates in heads, so that when the cars are slowed up these heads on the adjacent cars strike together, and by a longitudinal movement of the bars apply the brakes.

The Trowbridge Electrical Dynamometer.

The electrical dynamometer described in connection with Mr. Edison's electric generator, on p. 239, current volume, is the invention of Professor John Trowbridge, of Harvard University, and not of Professor J W. Trowbridge.

Correspondence.

Edison's Electrical Generator.

To the Editor of the Scientific American:

I can scarcely conceive it as possible that the article on the above subject in last week's SCIENTIFIC AMERICAN could have been written from statements derived from Mr. Edison himself, inasmuch as so many of the advantages claimed for the machine described and statements of the results obtained are so manifestly absurd as to indicate on the part of both writer and prompter a positive want of knowledge of the electric circuit and the principles governing the construction and operation of electric machines.

It is not my intention to criticise the design or construction of the machine (not because they are not open to criticism), as I am now, and have been for many years, engaged in the manufacture of electric machines, but rather to call attention to the impossibility of obtaining the described results without destroying the doctrine of the conservation and correlation of forces.

What the "important fact" "developed in the course of Mr Edison's experiments with this generator" is (if it means anything more than what Hjorth, Wilde, Siemens, and Wheatstone set forth many years ago) I am unable to comprehend from the description given.

It is stated that "the internal resistance of the armature" of this machine "is only ½ ohm." On this fact, and the disproportion between this resistance and that of the external circuit, the theory of the alleged efficiency of the machine is stated to be based, for we are informed that "while this generator in general principle is the same as in the best well known forms, still there is an all-important difference, which is that it will convert and deliver for useful work nearly double the number of foot pounds that any other machine will under like conditions." The explanation of this remarkable efficiency I quote: "Now the energy converted is distributed over the whole resistance, hence if the resistance of the machine be represented by 1, and the exterior circuit by 9, then of the total energy converted nine-tenths will be useful, as it is outside of the machine, and one-tenth is lost in the resistance of the machine."

How any one acquainted with the laws of the electric circuit can make such statements is what I cannot understand. The statement last quoted is mathematically absurd. It implies either that the machine is *capable of increasing its own electromotive force nine times without an increased expenditure of power*, or that external resistance is *not* resistance to the current induced in the Edison machine.

Does Mr. Edison, or any one for him, mean to say that $\frac{r}{n}$ enables him to obtain nE, and that C is *not* $= \frac{E}{\frac{r}{n}+R}$? If so, Mr Edison has discovered something *more* than perpetual motion, and Mr. Keely had better retire from the field.

Further on the writer gives us another example of this mode of reasoning, when, emboldened and satisfied with the absurd theory above exposed, he endeavors to prove the cause of the inefficiency of the Siemens and other machines. Couldn't the writer of the article see that since $C = \frac{E}{r+R}$, that by $\frac{R}{n}$ or by making $R = r$, the machine would, according to his theory, have returned more useful current to the circuit than could be due to the power employed (and in the ratio indicated), so that there would actually be a creation of force!

If such statements as these have been made by Mr. Edison to the representatives of the daily papers I think he has no cause to complain of the treatment received, but rather to consider himself fortunate that he has escaped rougher handling.

In conclusion, allow me to say that if Mr. Edison thinks he has accomplished so much by the *reduction of the internal resistance* of his machine, that he has much more to do in this direction before his machine will equal in *this respect* others already in the market.

EDWARD WESTON.

Newark, N. J., October 13, 1879.

Astronomical Notes.

OBSERVATORY OF VASSAR COLLEGE.

The computations in the following notes are by students of Vassar College. Although they are merely approximate, they will enable the observer to recognize the planets.

M. M

POSITIONS OF PLANETS FOR NOVEMBER, 1879.

Mercury.

On November 1 Mercury rises at 8h. 4m. A.M., and sets at 5h. 27m. P.M.

On November 30 Mercury rises at 8h. 43m. A.M., and sets at 5h. 29m. P.M.

Mercury will be in conjunction with the moon on the morning of November 15, and will be between the crescent moon and the horizon on the evening of that day.

Venus.

On November 1 Venus rises at 3h. 9m. A.M., and sets at 3h. 7m. P.M.

On November 30 Venus rises at 3h. 8m. A.M., and sets at 2h. 33m. P.M.

Venus will rise nearly with the waning moon on the 10th, being in conjunction with the moon at 8 A.M. Although passed the position of greatest brilliancy, Venus will be very conspicuous in the early morning during November.

Mars.

On November 1 Mars rises at 5h. 33m. P.M., and sets at 7h. 51m. A.M. of the next day.

On November 30 Mars rises at 3h. 5m. P.M., and sets at 5h. 12m. of the next morning.

Mars is in its best position in November, coming to the meridian at midnight of the 9th, at an altitude of more than 66°. Mars is in conjunction with the moon at midnight of the 26th.

Jupiter.

On November 1 Jupiter rises at 2h. 20m. P.M., and sets 55m. after midnight.

On November 30 Jupiter rises 29m. after noon, and sets at 11h. 10m. P.M.

If we examine the group of Jupiter satellites between the hours 8 and 10 of the November evenings we shall find the first satellite is hidden by occultation on the 5th, 12th, 21st, and 28th, for some portion of this time; the same satellite is unseen, because in transit, on the 13th and 20th; it is unseen at the same hour on the 21st, because it is in the shadow of the planet.

The second satellite is passing across the face of the planet in transit during these hours on November 8 and 15; it is in the shadow of Jupiter on the 17th and 24th.

The third satellite may be seen to enter upon the face of Jupiter between 9 and 10 P.M of November 3; it will come out of the shadow of Jupiter between 8 and 9 P.M. of November 7, and it will disappear by going into the shadow of Jupiter on the 14th.

The fourth satellite, which is the farthest from Jupiter, will reappear from behind Jupiter on the 27th, between 8 and 9 P.M.

All these changes are very easily seen with a small telescope.

Saturn.

On November 1 Saturn rises at 3h. 52m. P.M., and sets at 4h. 4m. of the next morning.

On November 30 Saturn rises at 1h. 55m. P.M., and sets at 2h. 4m. of the next morning.

The ring of Saturn is now opening to our view, and with a small glass the spaces between ring and ball can be seen on both sides. The satellite Titan can be seen, and on November 7 will be found (with an inverting glass) on the right of the planet. It is possible that Rhea may be seen with an object glass of 4 inches diameter.

With the glass at the Observatory of Vassar College, on October 6, the five small satellites interior to Titan were seen; Mimas, which is a very difficult object even with a large glass, was seen to move rapidly along the edge of the ring.

Uranus.

On November 1 Uranus rises at 1h. 25m. A.M., and on November 30 at 11h. 31m. P.M

Uranus is still among the stars of Leo, and not yet well situated for evening observers.

Neptune.

Neptune is in good position, but can be known as a planet only by aid of a good glass. It is among the stars of Cetus.

It rises on November 1 at 5h. 3m. P.M., and on November 30 at 3h. 6m. P.M.

Probable Death of Prof. Wise, the Aeronaut.

On Sunday, September 28, Prof. John Wise, the aeronaut, ascended in a balloon from Lindell Park, St. Louis, Mo., with one companion, and has not since been heard from. The balloon was last seen at about half past eleven the same night by an engineer of the Lake Shore and Michigan Railroad at Miller's Station, 35 miles from Chicago. It was plainly visible in the bright moonlight, not very high, and was drifting northeastward over the lake.

Prof. Wise was born in Lancaster, Pa., in 1808, and had made a practical study of aeronautics for over forty years. His last ascension was his three hundred and sixty-third. The fatal balloon was the "Pathfinder," and is described by the aeronaut's son, Charles E. Wise, as new and strong. It had never been used before. The bag was of material made expressly for it, and of the best quality for the purpose; the basket was one of the strongest, and was commodious.

Wages and Prices in Germany.

According to the official review, by Secretary Evarts, of the Consular reports from Germany, the condition of the laboring classes there is wretched and deplorable.

In the coal and iron mining districts, according to the report of the Consul at Barmen, it is almost impossible for a working man to earn more than enough for his individual support, and every member of the family is required to contribute to the general support. The Consul at Bremen writes that in order to make life possible women in the country raise garden produce, and work on the farms, while in the towns they keep shops, peddle, wash, sew, etc. As illustrating the general depression which prevails throughout Germany, and the wretchedness which exists among her laboring classes, the following extract is introduced from the report of the Consul at Chemnitz: "At the present time [June, 1878] large numbers are unable to obtain employment; the country is full of tramps, both honest and vagabondish, and almost every dwelling in this city is visited daily by at least a half dozen beggars, although begging is prohibited by law. In this district [Saxony] labor is subdivided, giving one man's work to two, in order to employ the largest possible number. As the husband's earnings are not sufficient for the support of his family, the wife and older children must contribute their share of the weekly earnings. This is a general rule, and applies to all families whose support is dependent on labor." The wages paid to mechanics in Germany are lower than those paid in France, and those paid in France are lower than those paid in Belgium. The average weekly wages of the agricultural laborer of Germany are as follows: Men without board or lodging, $3.50; with board and lodging, $1.80; women, without board or lodging, $1.55; with board and lodging, 60 cents. With such nominal wages it can be readily understood how, as the Consul at Sonneberg writes, "the workingman rarely eats meat at all in any other form than sausage, and his wife and children scarcely know its taste, so little do they get of it. There is poverty in superabundance in the workingman's home, often verging upon squalor; his children are generally barefooted, and his wife looks haggard and weary of her lot." The following extract from the report of the Consul at Chemnitz will illustrate at once the condition of the working classes of Germany and their disposition to be happy under the most pinching circumstances: "The poorer classes in Southern Saxony fare very meanly indeed. For houses they have generally a single room, which answers for workshop also. For household furniture, they have a few chairs or wooden stools, a table, stove, and sometimes a loom. For beds, they have the bare floors or straw pallets. For fuel, they have the dead branches fallen from the trees in the King's forest, carried home in their arms. For food, they have black bread, made of rye; coffee, made principally of chiccory; a few boiled potatoes; sometimes a little cheese, butter, or goose grease, and on Sundays a pound of meat for a family of five or six persons. But if 'poor and content' is rich, no others within my knowledge can compare in wealth with the poor of this district. They live in villages and love company. When Sundays or holidays come, they meet at restaurants, smoke poor tobacco, drink poor beer, talk, sing, and dance, and seem as happy as if they had a thousand a year."

Steam Towing on the Canals.

The extension of the Belgian cable towing system, lately illustrated and described in this paper, goes on rapidly in the Erie Canal. It is now complete to Rochester. The cost of towing by this system is reduced by one half, and the time consumed, two thirds. One great advantage of this method of towing is that boats will take full loads West, instead of part loads as at present, while the saving of freights will give New York virtually a free canal. This at least is the opinion of the President of the Buffalo Board of Trade, Mr. Alonzo Richmond.

Official Ink.

A commission lately appointed by the Prussian Government to investigate the best class of inks to be employed for official purposes, have just presented their report. They state that aniline inks are not suited for this purpose, because they can be easily washed away, especially by preparations of chlorine. Inks in the composition of which alizari (Adrianople red) is employed can be obliterated less easily. But they are of opinion that the best of all is that made from gall nuts, and recommend that it shall be used for official purposes, and for all documents the preservation of which is of importance.—*London Times.*

Good Paste.

Herr O. Heim, of Grimmen, gives a receipt for making a durable paste. He takes 20 grammes of wheat starch, and makes it into a stiff paste with a little cold water; then he pours 100 c. c. of boiling water all at once—not gradually—into this paste, and stirs it rapidly. A little carbolic or salicylic acid is then stirred in, and a paste is obtained which will keep indefinitely (or at any rate until it dries up) in a cool place. Care must be taken to have the best starch, as good paste cannot be made with the inferior kinds.

SPENCER WELLS recently performed his nine hundred and fifty-fifth ovariotomy, in which he employed bichloride of methyline as the anæsthetic. The bichloride has been employed in over 100,000 cases in England, without as yet a ringle evil result following its use.—*Mich Med. News.*