The Cincinnati Circular Saw Test.

During the Industrial Exposition held in Cincinnati last fall, a competitive trial between the circular saws of nine well known makers took place. The contest was briefly alluded to by us at the time: and since its occurrence, we have noted the fact that the prize offered, namely $100 in gold, was carried off by the solid-toothed saw made by Messrs. Emerson, Ford & Co., of Beaver Falls, Pa. The results obtained, owing to the thorough manner in which the competition was conducted, were very complete. We find them in tabulated form in the official report of the jurors, and reproduce them below, not doubting but what they will be of much interest to wood workers generally

The saws were of a uniform diameter of 56 inches, and each was required to cut a poplar log, 20 × 20 inches, and an oak log, 16 × 16 inches, and to make from each timber, respectively, 16 and 12 boards; or in other words, to saw through 300 and 176 square feet of lumber.

It will be observed from the annexed table that the competition was exceedingly close, and that the winning saw was narrowly pressed by the Hoe planer tooth tool. Comparing the times, the Hoe was but one second behind on the poplar log, and fifteen seconds on the oak log; but on the other hand, the Emerson had the advantage of slightly more revolutions, and in one case a faster feed. The Hoe furthermore produced twelve perfect oak boards, and in this respect stands ahead of any saw on the list. Taking results through, however, the award of the prize to the Emerson was a just one, but substantially the distinction between it and the Hoe saw is so small as to amount to nothing in practical use. There is no doubt but that both saws are exceptionally good tools; perhaps we may say each is the best of its class, the Emerson of the solid-toothed, the Hoe of the planer-toothed implements. At all events, both did admirably well; and for this reason, both are entitled to the best consideration of the public.

The following is the table above alluded to·

CONTESTANTS IN THE TRIAL OF SAWS AT THE CINCINNATI EXPOSITION, 1874.

		Kind of Wood.	Diam. of Saw.	Revolutions per Minute.	No. of Teeth.	Gauge. Eye.	Gauge. Teeth.	Gauge. Kerf.	Size of Log.	No. of Boards.	Time.	Square feet of Lumber.	Horse Power Indicated.	Feed.	Perfect Boards.	Imperfect.	Square feet lumber per minute.	Percent. of power used.
2.	E. Andrews	Poplar	56	648	40	5	7	3	20x20	16	2.53	300	95.48	3¾	..	16	105.8	.705
2.	E. Andrews	Oak	56	660	40	5	7	3	16x16	12	2.05	176	111.98	2½	..	12	104.	.782
1.	Hogan & Sowden	Poplar	56	600	42	7	11	7	20x20	16	2.50	300	100.68	2⅝	2	14	84 4	.592
3.	I. W. Baldridge & Co.	Poplar	56	640	48	8	9	4	20x20	16	2.53	300	99.23	2½	2	14	104.	.635
3.	I. W. Baldridge & Co.	Oak	56	690	48	8	9	4	16x16	12	2.03	176	118.62	2½	6	4	85.8	.906
4.	American Saw Co.	Poplar	56	634	40	6	8	3	20x20	16	2.31	300	10 .95	3⅜	3	13	119.5	.576
4.	American Saw Co.	Oak	56	638	40	6	8	3	16x16	12	2.02	176	97 .66	2½	6	6	86.5	.743
5.	Emerson, Ford & Co.	Poplar	56	615	50	6	7	3	20x20	16	2.44	300	120.16	3¾	12	4	109.7	.718
5.	Emerson, Ford & Co.	Oak	56	610	50	6	7	3	16x16	12	1 43	176	121 .63	3¾	10	2	102.5	.778
6.	Woodbridge & McParlin	Poplar	56	656	40	7	8	5	20x20	16	2.34	300	117 .33	3⅜	2	14	91 .3	.634
6.	Woodbridge & McParlin	Oak	56	636	40	7	8	5	16x16	12	1 .45	176	109 .49	3⅜	1	11	71 .8	.745
5.	Emerson Planer Tooth	Poplar	56	590	34	7	8	3	20x20	16	3.17	300	112 .89	2¾	4	12	116.9	.643
5.	Emerson Planer Tooth	Oak	56	632	34	7	8	3	16x16	12	2.27	176	114 .24	2½	..	12	100.5	.1000
7.	R. Hoe & Co., Solid Tooth	Poplar	56	519	36	5	8	2	20	20	16 2.09	300	112 .18	4¾	8	8	139.6	.527
7.	R. Hoe & Co., Chisel Tooth	Poplar	56	605	36	5	7	2	20x20	16	2.45	300	114 .73	3¾	8	8	109.1	.689
7.	R. Hoe & Co., Chisel Tooth	Oak	56	602	36	5	7	2	16x16	12	1.58	176	98 .82	2¾	12	..	0.	.720
8.	James Ohlen	Poplar	56	634	30	6	7	3	20x20	16	2.53	300	102.5	4¼	8	8	104.	.648
8.	James Ohlen	Oak	56	638	30	6	7	3	16x16	12	1.59	176	112 .12	3⅝	4	8	88.8	.820
9.	Curtis & Co.	Poplar	56	681	50	8	10	6	20x20	16	2.51	300	84 .24	3¾	..	16	105 .2	.507
9.	Curtis & Co.	Oak	56	610	50	8	10	6	16x16	12	2.30	176	101 .42	2½	2	10	70.4	.945

Correspondence.

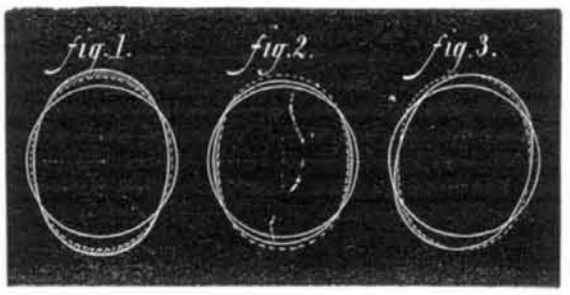
The Cause of the Tides.

To the Editor of the Scientific American:

On page 273 of your current volume, Professor S. H. Trowbridge inquires into the cause of tides. I will try to disperse his doubts in as few words as the subject will admit of.

It is beyond doubt that tides are caused principally by the action of the moon, as their periods keep pace with the apparent motion of the moon, and have done so for centuries. We know that the earth and moon are attracted by each other; and on the other hand, we know that these two bodies are not approaching. There must, therefore, evidently exist another force which balances the attraction. It is generally said that the moon rotates round the earth once a month, but in reality both moon and earth rotate round their mutual center of gravity. By this peculiar rotation, a force akin to centrifugal force is produced, which prevents the approaching of the two bodies. Now we see that there are two forces acting between earth and moon, which are in perfect equilibrium in the centers of either of the two bodies. But the attractive force is greater in those parts of the earth that are nearer the moon, and causes an upheaval of water on that side. On the opposite side of the earth the contrary is the case, namely, the attraction towards the moon is less than in the center of the earth, and that force, which keeps moon and earth apart, gets the overhand and causes an upheaval of water on that side also. The tidal wave produced by the moon must, therefore, be necessarily a double one. The wave caused by the sun is double for the same reason. On the side of the earth nearest the sun the attraction is greater, and on the opposite side the centrifugal force, caused by the orbital motion of the earth, is gaining on the diminished attraction.

A tidal wave caused by the moon alone would have the shape shown by dotted line in Fig. 1 (greatly exaggerated in dimension, of course). If now the sun and moon form a straight line with the earth, no matter whether on the same or on opposite sides, the solar wave will be produced in addition to the lunar wave; and the real tide is shown in the diagram, where the additional solar tide is cross-lined. We see that spring tides are produced in both cases. When, however, sun and moon are in quadrature, the solar flood will be on the lunar ebb, and the solar ebb on the lunar flood, as indicated in Fig. 2. A glance will show that the results are not four floods a day, as your correspondent supposed, but merely a diminution of the lunar tide. When the sun and moon form an angle of 45°, or 135°, or any other oblique angle, the solar wave is on one side of the lunar wave, causing, as it were, an inclination of the resulting wave, which may be in advance or in rear of the lunar wave, according to the relative position of sun and moon. The period of the



high tide is, therefore, subject to slight variations; but the mean duration coincides mathematically with the mean apparent motion of the moon.

The hight of the wave is in proportion to the depth of the sea, or to the quantity of water exposed to the tidal influences.

The velocity of a wave must not be confounded with the velocity of the transmitter of the wave. The hight of the tidal wave is so small in comparison to its length that the motion of the transmitter is next to nothing, comparatively speaking, and it can therefore not do much harm in dashing upon the shore. For the same reason, we have no means of observing the wave on the high seas.

The tidal influence tends to draw the tidal wave round the earth at a rate of about one thousand miles an hour, while the natural velocity of waves (depending on the depth of the sea) is considerably less. The effect will be similar to that of ringing a bell by pulling at intervals which are not in harmony with the period of oscillation of the bell. Such a motion will be very irregular, and will be nearly *nil* at times. The original tidal wave, transmitted with the greater velocity, will interfere with the naturally transmitted tidal waves from other portions of the same sea; and as this interference is of a purely local character, it will be easily understood how it happens that, on some shores, the tidal wave does not exceed 2 or 3 feet, while on others, where the interfering waves meet each other, the tide may rise even to a hight of 30 or 40 feet.

The water of the English Channel is very shallow, and therefore the original tidal wave is very small. However, the reaction of the tide of the deeper Atlantic produces a wave in the channel which progresses towards the east and reaches the North German coast more than 12 hours after its origination. This and other similar facts are not in the least in opposition to the present theory, which the most careful criticism only confirms. HUGO BILGRAM.

Philadelphia, Pa.

Salicylic Acid.

To the Editor of the Scientific American:

Your very well written and explicit account of salicylic acid, appearing in a recent number of the SCIENTIFIC AMERICAN, leaves but little to be said upon that subject. However, the statement that salicylic acid has not yet been experimented with in contagious maladies will admit of modification. Almost the first experiments ever made with this acid were made by myself, in Leipsic, at the time of its discovery by the learned Kolbe, who requested me to make such experiments and report them to him. They are briefly as follows (see *The Lancet*, London, November 28, 1874): Taking two vessels, a portion of the defections of a patient suffering with violent intestinal catarrh (there being no cholera then) was left in each; into the one was thrown two drachms salicylic acid, into the other nothing. A microscopical examination afterwards revealed parasites (*leptothrix* and *infusoria*) in the second, while the first remained entirely free from organic matter. Salicylic acid also eradicates the urate of ammonia from urine. It is, in the crude state, a salmon-colored glistening powder, and it is used in this form to disinfect vaults and cesspools.

It has been urged against this acid that it is not so easily soluble as carbolic acid; but the trifling delay may be overcome by the addition of one part of the phosphate of soda, which makes the solution perfect at once, and does not in any manner affect its disinfecting agency. When thrown in spray from the atomizer, it does not evaporate like carbolic acid. It is of great value in certain forms of venereal diseases, which, according to the last developments, are of parasitical nature.

The first specimens of salicylic acid ever brought to America were brought here by me in June last, and given to Professor N. R. Smith of this city, and to the Academy of Medicine in Ohio, who adopted it (on trial) into their hospital: they afterwards published my investigations and their report, edited by Professor Orr, in *The Clinic* of November 7, 1874.

The first article ever written upon the use of salicylic acid as a disinfectant was written by myself in Leipsic in May, 1874 (*cholera Asiatica*, published under the auspices of the Medical Board, afterwards translated into English for the *Baltimore Gazette* of July 10, 1874).

My object in thus particularizing is to present my claim to having introduced salicylic acid into this country. I hope you will do me the justice to insert this.

GEO. HALSTED BOYLAND, M.A., M.D.

Maryland Academy of Sciences.

American Steel Manufacture.

To the Editor of the Scientific American:

We notice in your paper of May 8, 1875, an article entitled "The Recent Remarkable Progress in the Steel Industry," which, we think, does us an injustice, unintentional, no doubt; but at the same time, we think you ought to correct the same. You say "the Port Henry product yields seventy per cent in the furnace, and the deposit is seeming inexhaustable. The ore, however, is not capable of being smelted into steel."

The remark is correct as applied to our Old Bed ore; but the person furnishing you with information overlooks entirely our New Bed ore, which is used for Bessemer steel purposes. The whole supply, nearly, for the last four years, has been used by Messrs. Witherbees and Fletchers, in their blast furnace, for making pig iron, all or nearly all of which was sold to Messrs. John A. Griswold & Co., of Troy, for making Bessemer steel. Witherbees & Fletchers shipped them about 3,000 tuns of the same in this present winter and spring. The Cedar Port Iron Company of this place have a new blast furnace nearly ready to blow in; and they expect to use this same ore for making iron for Bessemer purposes.

WITHERBEES, SHERMAN & CO.

Port Henry, N. Y.

To the Editor of the Scientific American:

In an article in your issue of May 8, you speak of the Crown Point ore "from which steel can be at once produced, without admixture of other ores." By this the reader will understand that the pig iron from the Crown Point ore is of a quality that, by itself, will make first quality Bessemer steel.

We believe that you will, by inquiry, find that this is not correct; and while the Crown Point iron can be and is used for Bessemer steel, it is with a mixture of other irons which are lower in phosphorus and sulphur. The furnace at Crown Point is allowed a maximum limit, in its pig iron, of 0·35 per cent of phosphorus, and 0·23 per cent of sulphur, proportions which are not admissible in Bessemer steel irons without an admixture of other irons which will bring down the average of phosphorus and sulphur.

Cleveland, Ohio. H. B. TUTTLE.

SCIENTIFIC AND PRACTICAL INFORMATION.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Mr. F. W. Clarke, of Cincinnati, Ohio, was appointed, at the last meeting of the above named society, to make an effort to obtain a full attendance of chemists, manufacturers, and others interested in the progress of chemical science, a subsection of the Association being especially and permanently devoted to that science and its branches. He asks us to state that the next meeting will be held at Detroit, Mich., commencing on August 11.

RECENT ASTRONOMICAL DISCOVERIES.

The first calculations based on the data obtained by the transit of Venus observations have been announced by Pirieseux. The solar parallax determined is 8·879 seconds, data noted by the French observing party at Pekin being used.

A telegram from the English eclipse expedition at Bangkok, Siam, announces success in photographing the spectrum of the chromosphere, during the recent solar eclipse. Eight good pictures of the corona were taken.

The discovery of another small planet, No. 144, has been made by Perrotin of Marseilles.

FAULTS OF CONSTRUCTION IN BATTERY CONTACTS.

Emile Girouard points out that one great obstacle in the way of our obtaining cheap electricity lies in the defect of the contacts. The rivets which connect the zinc to the carbon are often ill made; and after having been in use for some time, they are corroded all round, and the oxidation prevents the contact from being perfect. The current, consequently, is unable to pass, unless the tension is considerable enough to overcome the bad conductivity of the oxides. The author proposes to obviate these defects by having all connections, etc., made of platinum.

O. E. W. says: "The SCIENTIFIC AMERICAN is now in its thirtieth year; and during the entire time, I have scarcely missed reading a dozen numbers of it. All that you claim for it and much more is true; it cannot be excelled, and no other paper of its kind equals it. I want to thank you now for the thousand useful things that I have gathered from it, and I hope that its pages may never be less."