PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

We continue below our abstracts of the papers read before the Hartford convention. Professor E. S. Morse, in a paper on the ascending process of the astragalus in birds, expressed the belief that the above process represented the intermedium of reptiles. This view he has confirmed by studying the embryo of the common tern.

Professor Wheildon, on the lobster, said that the process of shedding the shell is generally known, excepting perhaps that relating to the large claws. The body opens in a straight line in the length of the back, while the tail, legs, and claws are drawn out from the shell, leaving it entire, as it has been called, an articulated skelet n which is thrown off periodically. It is found that in that portion of the claw near the body a part of the shell decays and falls out, making sufficient room for the passage of the claw. The portion of shell indicated is that small, smooth part that lies flat upon the body. The lines indicating this portion are to be distinctly seen in all lobsters which are approaching the period of shedding the shell, and these become gradually more distinct until that part becomes semi-transparent and finally decays.

In a paper on the significance of classes among vertebrates, Professor Gill considered that no groups of animals should be combined in classes which are more widely differentiated morphologically from each other than are the birds and mammals. The differences between the extremes of the group of fishes are immeasurably greater than are those between mammals and birds, and still more than those between birds and reptiles. Instead of the old classes, birds, mammals, and fishes, we should have eight, combined in an entirely different manner, namely: (1) Mammals, (2) birds, (3) reptiles, (4) batrachians, (5) fishes, (6) elasmobranchiates, (7) marsupobranchiates, and (8) leptotardians.

Professor B. A. Gould, referring to

THE NUMBERS AND DISTRIBUTION OF THE FIXED STARS,

states that, if we assume, according to hypothesis, an equal number of stars in each hemisphere, there are altogether not less than 15,300 stars as bright as the seventh magnitude. But since the count indicates an excess of bright stars in the northern sky, there may be a thousand more, as given by the formula. The numbers of the *Durchmusterung* imply the existence of over 200,000 stars as bright as the ninth magnitudes, though the magnitudes of faint stars in that work seem given on the average a little too bright. The two classes of considerations—the approxmate method furnished by the hypothesis of an equable distribution of stars and the existence of a well marked zone of very bright stars as much inclined to the Milky Way as the equator is to the ecliptic, may assist in determining the position of our sun with reference to its own cluster, that of the cluster itself, and the scale of distances between its constituent stars.

Mr. J. H. Kuppart read an interesting paper on the

EXTINCT HOGS OF OHIO,

in which he alluded to certain fossil remains of animals of the *Iuidae* family, found in digging sand in the city of Columbus, O. The skeletons have a close resemblance to that of the South American peccany, and are the first complete ones ever found. There may be sufficient differences to constitute a new species, the most striking peculiarities about the head of these fossils being the small incisors, the somewhat longer canines, the thinner and more compressed cranium, and the eversion of the lower and posterior angles of the lower jaw.

THE DISINTEGRATION OF ROCKS

was the subject of an address by Professor T. Henry Hunt. The change of the rocks in question is a chemical one, which is most obvious in the case of crystaline rocks; the felspar loses its alkalies and part of its silver, being changed into clay, and the hornblende its lime and magnesia, retaining its iron and peroxide. From this results a softening and decay to greater or less depths of the strata, so that, while the beds still retain their arrangement, and are seen to be traversed by veins of quartz and metallic ores, the strata are often so much changed, to depths of one hundred feet or more from the surface, as to be readily removed by the action of the water. This phenomenon is well seen in the crystaline rocks of the Blue Ridge, and not less remarkably in those of Brazil.

According to the speaker, it has been a subaerial process, which has been at work during past ages, when the composition of the atmosphere and the climatic conditions differed from those of today, and when carbonic acid, aided by warmth and moisture, abounded. He connected it with that slow purification of the atmosphere which from very early times has been going on. He thought it probable that the process of decay had gone on with decreasing energy to our own times, though it is now insignificant in its action, owing to changed atmospheric conditions.

THE POPULATION OF THE UNITED STATES

was discussed by Professor E. B. Elliott, in a curious paper in which he described calculations made by taking the differences between the figures as given by the various census, and making suitable interpolations for intervening years. Taking the average of these differences, we find that, had there been no war, the population in 1870 would have been 41,718,000 instead of 35,558,000, showing a loss of fully 3,000,000 people. In 1880, the population would be 54,017,000, but making the same allowance, he estimates now that it will be but 50,858,000. The population for the present year, 1874, is placed at 43,167,000. To statisticians, the table, given for every year from 1780 to 1880, is a very interesting one, as is also a tabular statement giving expenditures of the government *per capita* of the population in periods of four years each. Except during war times, there has been great uniformity, rarely exceeding $2 per head per annum. The highest was during Lincoln's first term, averaging $16.76 gold, and the lowest during Jackson's first term, $1.20·5. The present rate is estimated at $1.69 gold, deducting war influence, or $6 37 counting the same.

Professor W. A. Rogers described the Harvard College system of

SENDING TIME BY TELEGRAPH.

The method consists simply in inserting, int the circuit passing through the clock, an ordinary telegraphic sounder. At every second beat of the pendulum, the circuit is broken and a click of the magnet is heard. By a simple device the clock is made to omit every fifty-eighth second. When one, therefore, wishes to ascertain the error of his time piece, he has only to watch for the omitted break, and the first click thereafter is the exact beginning of a minute as shown by the time clock at the observatory. At every even five minutes, there is an omission of about 25 seconds preceding.

The same speaker, in a paper on the

PROPER MOTION OF ϵ DRACONIS

in right ascension, stated that he found evidence of an irregular proper motion, the star appearing to complete its revolution in from 40 to 60 years. He also pointed out that no predictions of the plane of this star have been verified by subsequent observations.

Professor Hough described an interesting apparatus for

PRINTING THE DIRECTION OF THE WIND,

as well as the velocity, hourly.

The apparatus for velocity consists of a movement for giving motion to a set of type wheels, which is unlocked for each tenth of a mile of wind. Four brass type arms, on which are engraved the letters N. S. E. W., are placed on the prolongation of the shaft, carrying the type wheels for velocity; and these arms, by means of connecting rods, are attached to the armatures of four electro-magnets. Telegraph wires communicating with the vane shaft and magnets cause one or more of the letters to be elevated for printing whenever the battery current is completed.

By means of a half second pendulum clock, an impression for direction and velocity is made hourly on a slip of paper two inches wide and eight inches in length, as follows:

Time	Direction	Velocity	Time	Direction	Velocity
0	N. E.	342	1	N.	360
2	N. E.	372	3	N. E.	385

The first column is the time, the second the direction, and the third the velocity in miles.

So far as Professor Hough is informed, this is the first and only mechanism for printing the direction and velocity. The total distance traveled by the wind in a day, month, or year is read from the sheet without computation; consequently, the device is eminently labor-saving.

Professor Gill, on the relations of certain genera of *canidæ*, said that the division, into two groups of wolves and red and gray foxes, does not express the true relation of the animals. He cited certain characteristics to prove that all should be united in one group.

Professor Le Conte read a paper on the

REPLACEMENT OF INJURIOUS INSECTS,

and mentioned the replacement of one caterpillar which had become a great nuisance in Philadelphia by another, equally as troublesome. No sooner had the sparrows exterminated the first than the second variety appeared. Its family is *orygia leucostigma*. The birds will not eat it. Having attained its full growth on the tree, it crawls quietly to a neighboring wall or fence, and, fixing its cocoon, undergoes transformation. The remedy against the annoyance is, therefore, very simple. Direct the servants, with stiff brushes, to sweep the cocoons from the walls and fences, and place around the trees to be protected rings of tin plate inclined at an angle. This will give the trees immunity, because the insects are not provided with wings for flight.

Professor C. H. Hitchcock discussed the

PHYSICAL HISTORY OF NEW HAMPSHIRE,

giving a sketch of its growth from the earliest times, when an archipelago existed there, up to the present. The first period was characterized by the formation of porphyritic granite, then came a series of gneisses composing the Mount Washington range of mountains. The Labrador period, the rocks of which are composed of granite and felspar, followed, and then the Huronian formation, of very great thickness, succeeded. The next period was the most extensive, the rocks consisting of mica schist; and the last period shows the area submerged by the ocean in the Helderberg period. It occupied the Connecticut valley to the depth of 1,000 feet.

In a paper on the pottery of the mound builders, Professor Cox drew the conclusion that the art of manufacturing concrete or artificial stone did not originate solely with the ancient Romans, but that it was alike understood by the earliest aborigines of America.

President Barnard delivered a brief address on the

METRIC SYSTEM,

in which he said that it will become the sole system in use by civilized nations before the year 1900. He added that the Metrological Society was urging the change in respect to uniformity—a change of only three tenths of one cent upon the dollar—upon our government. That Society will also urge a metrical international coinage; not for immediate use within our territory, but for convenience in commercial exchanges and to facilitate travelers in all parts of the world. Whether such a coinage would eventually take the place of our usual currency might be safely left to the future.

Professor Elliot, in another paper on the United States government, said that its present borrowing power is 20 per cent superior to that of France, the rates paid by the former being 5 per cent, and those of the latter 6 per cent per annum. Professor Wm. H. Brewer, on the

DISTRIBUTION OF AMERICAN WOODLANDS,

said that the flora of the United States contained over 800 trees. Of these trees about 250 species are somewheres tolerably abundant, about 120 species grow to a tolerably large size, 20 attain a hight of 100 feet, 12 a hight sometimes of over 200, and a few—perhaps 5 or 6—a hight of 300 New England contains 80 or 85 species, of which 50 may reach a hight of 50 feet. The Middle States have about 100 to 105 species of trees, 65 to 67 of which sometimes reach 50 feet in hight. Here were originally very heavy forests. There are still large areas heavily timbered, but the timber for all purposes is unquestionably rapidly diminishing and there is no compensating influence going on for increase. In the southeastern region—that is, extending from Virginia and Florida—we have ab ut 130 species. In each case these form the conspicuous elements of the landscape. Seventy-five attain a hight of 50 feet or more, and about a dozen species a hight of 100 feet. The northwestern region, from Ohio to Minnesota, and north of the Ohio River, is represented by about 105 to 110 species, 68 or 70 of which may reach a hight of 50 feet. That is the district furnishing at present the largest production of sawn lumber within the United States. Michigan alone furnished in 1870, of the 12,750,000 of M. feet, 2,250,000: Wisconsin furnished over 1,000,000—the two States thus producing more than one fourth of the whole yield returned in that year. The southwestern region, extending from Kentucky to Texas and the Gulf, has about 112 to 118 species, 60 or 65 of which attain a hight of 50 feet, which the author also analyzed. West of these last two districts, this treeless belt, extending entirely across the continent from the Gulf of Mexico to the Arctic Ocean, is 350 miles wide in its narrowest part, between latitude 36° and 37°, and 800 miles wide on our northern border. The Rocky Mountain region consists of from 28 to 30 species, but a vastly smaller number making up the timber region. With one single exception, all of the trees within the United States which attain a hight of 200 feet are found in Washington Territory and Oregon. The forests are entirely of cone-bearing trees and the number of species is large, the number of timber trees being very large and their size and value also being great. In Washington Territory, official reports state that the land will produce from 25,000 to 300,000 feet per acre, and that there are vast tracts "that would cover the entire surface with cord wood 10 feet in hight."

Mr. Porter C. Bliss read two papers, one on a classification of the Indian languages of Mexico, and the other relating to marks of ancient civilization in that country.

Referring to the

REVERSION OF THOROUGHBRED ANIMALS,

Professor Brewer said that it is often claimed that, if the care of man be withdrawn, the improved breed will retrace the steps of its ancestry and revert to its original characteristics. For some years Professor Brewer has been investigating this subject by every possible means, and, finding no instances of the alleged "reversion" to be authenticated, he considers that the pernicious notion should be exposed and refuted.

Phosphor-Bronze Axle Bearings.

When two bodies are rubbed against each other (under equal pressure, and at equal velocity), the harder they are, the greater is the amount of heat generated; or on the other hand, the greater the difference of hardness between the two bodies rubbed against each other, the less is the heat produced. In the latter case the harder body is more heated than the softer, if of equal size. If, for instance, glass is rubbed against cork, the heating is as 7 to 1 (the copper being heated seven times hotter than the cork); if copper is rubbed against cork, as 4 to 1.

The ideal of a bearing which would wear little would be one made of the same material as the axle revolving in it, if there had not to be taken into consideration the wearing of the axle itself and the heating. A bearing made of the softest material, in which an axle of the hardest material revolves, would be the ideal of a bearing which does not heat, and does not cut the axle, if the wear of the bearing, and deformation by pressure, etc., had not to be taken into consideration.

In practice the best medium must be found which

1. Does not cut the axle.
2. Wears (in itself) as little as possible, and consequently requires a minimum of lubrication.
3. Does not heat, even in case lubrication should be neglected.
4. Is capable of resisting any possible shock without changing its form, or breaking.

Some railway companies desire to use few bearings, at the expense of many axles and much lubricant—(the consumption of lubricant is always in proportion to the wear of the axle on the bearing)—and therefore use bearings containing from 17 to 20 per cent of tin and 83 to 80 per cent of copper, which alloy, undoubtedly, is too hard, and must attack the axle, as has been shown on many railways. Other railway companies use alloys of lead with more or less antimony, which certainly do not attack the axles, but require much lubricant, and wear out very fast. A great number of railway companies in Germany take refuge in the so-called white metal, which, if of proper composition, appears cheap, but in the long run certainly is the most expensive. The alloys of copper, antimony, and tin, or so called white metal, are bad makeshifts, as well as the so called lead composition bearings of lead and antimony; for it is impossible to give these alloys a hardness approaching that of the revolving axle without rendering them brittle. If an alloy is used sufficiently hard to avoid great wear, these bearings will heat much and are very brittle.

On most of the English, Belgian, German, French, and particularly on American railroads, white metal, and especially lead composition, bearings are little used, and this with good reason; for what would become, for instance, of a white metal bearing on an American railroad, where the bearings are subjected not only to heavy loads, but where they have to travel thousands of miles on rails belonging to other companies, and therefore are not much looked after.

Gun metal bearings, alloys of tin and copper, are not often homogeneous, with exception of the alloy of 17 to 18 per cent of copper, which is the most trustworthy alloy of tin and copper. In alloys containing a lower percentage of tin, the latter segregates in the form of tin spots, when the alloy cools slowly. All other compositions in use for bearings, such as 12 to 17 per cent of tin and 88 to 83 per cent of copper, do not make homogeneous bearings, unless they are cast in chill molds, which in practice is impossible. This heterogeneity of gun metal bearings is dangerous, as it produces gripping, and thereby a rapid wear. This specific quality of gun metal bearings (to grip) is theoretically easily explained: In cooling, the softer metal (composed of from 7 to 10 per cent of tin and 93 to 90 per cent of copper), being the less fusible, sets first, forming the skeleton of the bearing; later, the very hard and brittle alloy, containing 17 to 18 per cent of tin and 83 to 82 per cent of copper, sets and fills the pores of the softer skeleton. The particles of the harder alloy are easily torn away by the axle if the bearing is not sufficiently lubricated, and these tear the skeleton composed of the softer alloy; this I have frequently observed at rolling mills where the bearings were not sufficiently lubricated, and where particles in the form of small flakes peel off.

A good bearing which answers all purposes must not be homogeneous, but must consist of a strong and tough skeleton, the hardness of which nearly equals that of the axle, in order to resist shocks without deformation, and the pores of this skeleton must be filled with the soft metal or alloy.

The nearer the hardness of the skelton approaches the hardness of the axle, the better the bearing will resist the pressure or shocks; and the softer the metal filling the pores, the better the bearing is in every respect. Such bearings are now made by melting two or more alloys of different hardness and fusibility together, in such proportions that necessarily a separation into two alloys of definite composition takes place in cooling.

Phosphor-bronze bearings consist of a uniform skeleton of very tough phosphor bronze, the hardness of which may be easily regulated to equal the hardness of the axle, while the pores are filled with a soft alloy of lead and tin.

Such a phosphor bronze bearing may therefore be considered as having its wearing surface composed of a great number of small bearings of very soft metal encased in the tough and strong metal which equals the hardness of the axle; on the planed bearing surface this molecular disposition cannot be detected by the naked eye, but, if examined with a magnifying glass, the truth of the above will at once be seen. Another practical proof can be given by exposing such bearings to a dull red heat, when the soft alloy will sweat out, and the hard, spongy, skeleton-like mass remains.

In this consist the great advantages of phosphor-bronze bearings, which is proved wherever tested; for while the axle partly runs on a very soft metal and thus obviates heating, even if not sufficiently lubricated, the harder part of the bearing, its skeleton, does not allow of wear taking place; and as the hardness is arranged to equal the hardness of the axle, wear is reduced to its very minimum.—*Dr. Charles Kunzel*

Use of Iron Instead of Lead Shot in the Rinsing of Bottles.

Lead shot, where so used, often leaves carbonate of lead on the internal surface, and this is apt to be dissolved in the wine or other liquids afterward introduced, with poisonous results; and particles of the shot are sometimes inadvertently left in the bottle. M. Fordos states that clippings of iron wire are a better means of rinsing. They are easily had, and the cleaning is rapid and complete. The iron is attacked by the oxygen of the air, but the ferruginous compound does not attach to the sides of the bottle, and is easily removed in washing. Besides, a little oxidized iron is not injurious to health. M. Fordos further found that the slight traces of iron left had no apparent effect on the color of red wines; it had on white wines but very little; and he thinks it might be better to use clippings of tin for the latter.

Fast Steaming.

One of the finest and fastest steamboats on the Hudson river is the Mary Powell. Recently she made the distance from New York to Piermont, 28 miles, in one hour, while the actual running time to Poughkeepsie, 74½ miles, was 3h. 19m., or at the average rate of 22⅓ miles per hour. Boiler pressure, 37 lbs. The Powell is fitted with the ordinary single vertical cylinder, walking beam engine.

PARASITES.—It is common to note that each species of animal has its own parasites, which can exist only upon creatures which have more or less kinship with their host. Thus the *ascarix mystax*, which torments the domestic cat, is found in all species of *felis*, while the fox, so closely resembling the wolf or the dog, is never troubled with the *tænia senata*, common in the last mentioned animal.

THE VIBRATIONS OF SOLIDS OPTICALLY STUDIED.

Professor Ogden N. Rood, of Columbia College, communicates to the *American Journal of Science and Arts* a new method of ascertaining whether two tuning forks, for example, are in unison, or to determine the difference in the number of vibrations executed by them in a second. A short piece of fine steel wire is attached to each of the forks, and the latter are supported as shown in Fig. 1. The forks

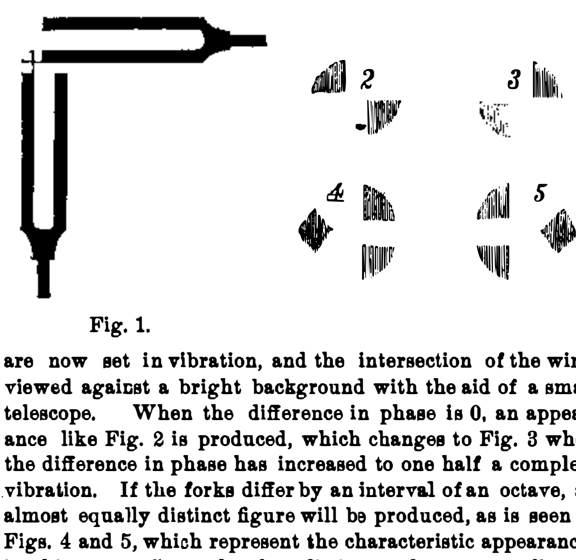

Fig. 1.

are now set in vibration, and the intersection of the wires viewed against a bright background with the aid of a small telescope. When the difference in phase is 0, an appearance like Fig. 2 is produced, which changes to Fig. 3 when the difference in phase has increased to one half a complete vibration. If the forks differ by an interval of an octave, an almost equally distinct figure will be produced, as is seen in Figs. 4 and 5, which represent the characteristic appearances in this case. Somewhat less distinct and more complicated figures are given by the quint, the duodecimo, and the double octave.

It is easy with this method to bring a vibrating string into unison with a given tuning fork, or to adjust it so that the interval shall be a quint, octave, twelfth, or double octave, above or below. It is also easy to ascertain the number of vibrations made by a string in a given case, by the aid of a bridge and a properly selected fork making a known number of vibrations, the string being shortened till it furnishes one of the above mentioned figures, and executes hence a known number of vibrations, after which the number of vibrations made by its whole length can readily be calculated by a well known law.

To bring two cords into unison, or to produce one of the above mentioned intervals, a cork cut at an angle of 45° is placed between the strings on the monochord, and, supported at this angle, is a small piece of looking glass of good quality. The reflected and vertical image of the farther string was then seen in the telescope crossed by the horizontal image of the nearer string; and the mirror being turned so as to reflect, at the same time, light from the sky, all the conditions were fulfilled.

Rods or bars, supported at one extremity or at two nodes, and provided with fine terminal wires, can by this method be brought into unison, or have one of the above mentioned intervals established between them. A preferable mode, however, is to study them in connection with the monochord and a tuning fork. The entire string of the monochord is first brought into unison with a tuning fork, or some definite interval established; the cord and rod or bar are then combined at right angles, and the bridge moved till unison is again effected, when it is possible to calculate the number of vibrations actually executed by the bar or plate. If the fine wire is attached to one side of a bell, the number of vibrations executed by the bell can readily be obtained with the monochord in the manner already indicated.

Vibrating membranes can readily be studied in this way by attaching to them a small piece of fine wire bent with two right angles, and using them in connection with the monochord or a tuning fork.

The more important of these figures may be easily rendered visible to a large audience. Wires about a milimeter thick are attached to two tuning forks placed in front of a magic lantern; an image is formed on the screen with the aid of a lens of about 0·315 inch focal length; the figures are then well shown, along with certain of their details not particularly mentioned in this article.

Great Expositions.

A correspondent of the New York *Tribune* writes from Vienna that the loss of the Austrian government, in its outlays on the recent Great Exposition of 1873, was nine millions of dollars. We have heretofore chronicled the recent suspension of the series of annual World's Expositions, which were inaugurated by the Exhibition Commission in London, and intended to continue until 1876. The losses were so heavy that the Commission was obliged to discontinue them. In view of facts like these, the American people may congratulate themselves that Congress, at its last session, refused to authorize the squandering of public money on the Centennial Exhibition at Philadelphia. The truth is that this Great Exposition business has "played out." It has ceased to be an attraction for the masses, and is chiefly useful for the advertising purposes of enterprizing dealers.

C. H. C. suggests that telegraph companies plant trees on which to hang their wires. "In most sections of the country, the tree first planted would cost but little more than a pole, and after two or three years in growth would be a per manent pole which not rot at the bottom or need resetting, and would be seldom struck by lightning. Having many times seen from three to a dozen poles, in a row, shivered by a charge of electricity running along the wires, the above question arose in my mind."

Pittsburgh Manufacturers for 1873.

Some weeks since, the Pittsburgh *Dispatch* of this city published a list of sales of houses in Pittsburgh doing a business of over $50,000 a year. The list was very imperfect; but as it is so difficult to get statistics in Pittsburgh we have compiled from this list, which was copied from the assessor's list, the items relating to our iron, steel, copper, and glass industries, believing that, imperfect as they are, they will be of value. We do not give the totals of each industry, as this would by no means give the volume of business. We would also say that none of the Allegheny manufacturers are included in this.

In the entire list there are but two houses outside of those connected with the industries given below that did a business of over $1,000,000. As will be seen, three houses in the iron or steel business did above this sum, namely: Jones & Laughlins, J. Painter & Sons, and Hussey, Wells & Co.

IRON.

Graff, Bennett & Co	$914,700	Lloyd & Black	$540,400
J Painter & Sons	1,439,600	Zug & Co	704,690
Chess, Smyth & Co	625,400	Shoenberger & Co	740,000
Jones & Laughlins	2,750,000	Wm. Clark & Co	431 900
Brown & Co.*	793,500	McKnight, Duncan & Co	527,200
Everson, Graff & Macrum	425,000	Dilworth, Porter & Co	393,000

* Including steel.

STEEL.

Singer, Nimick & Co	$879,600	Park, Bro. & Co	$468,500
Anderson & Woods	917,300	Pittsburgh Steel Casting Co	87,500
Hussey, Wells & Co	1,150,000	Miller, Barr & Parkin	589,000

GLASS.

Bryce, Walker & Co	$166,070	Thos Wightman & Co	$300 000
Campbell, Jones & Co	72,300	Dithridge & Co	152.600
McKee Bros.	230.500	Glass, Nelley & Co	451,400
S McKee & Co	188,000	Crystal Glass Co	92,600
R C. Schmertz & Co	112,200	Atterbury & Co	168,800
Duff & Campbell	104,500	Adams & Co	121 800
Excelsior Flint Glass Co	125,900	Bakewell, Pears & Co	150 000
Keystone Flint Glass Co	103.100	Challoner, Hoglan & Co	168.100
Knox, Kim & Co	67,700	Geo. Duncan & Sons	98.500
Jas. B. Lyon & Co	119,400	King, Son & Co	166,900
Wm. McCully & Co	486,100	Dorrington Bros	81,800
Wolfe, Howard & Co	100,000		

MISCELLANEOUS.

Brenneman & Wallack, boilers	$ 53.200
A. Hartupee & Co., engines, etc	326 000
Wm. Miller, forge	140,900
W. G. Price, Sr., foundery	68,600
N. Snyder & Co., boilers	108.800
W. P. Townsend & Co., rivets	185.000
A. Bradley & Co, stoves	74,200
De Haven & Sons. stoves	76,000
Evans, Dalzell & Co., pipes	624 000
W. Graff & Co., pipes	178,400
Jacobus & Nimick Manufacturing Co., novelty goods	173,100
Park & Co., copper	189,300
Graff, Hugus & Co., stoves	150,000
C. G. Hussey & Co., copper	595,000
Mitchell, Stevenson & Co., stoves	175 000
Marshall Bros., machinery	56,000
Bissell & Co., stoves	113,000
A. Garrison & Co., founders	279 600
John B. Herron & Co., stoves	59,400
L. Peterson, Jr. & Co., founders	86 300
Alex. Speer & Sons, plows	150,500
Jos Marshall & Co., founders	140,000
Dickson, Marshall & Co, founders	78,600
A. French & Co., springs	366,600
McConway, Torley & Co., malleable iron	68,000
Totten & Co., founders	321,100
Schaal, Hoeveler & Co., boilers	93,700
Klein, Logan & Co., tools	60,800
Lewis & Rossiter, founders	90,000

—*American Manufacturer & Iron World*, Pittsburgh.

IMPORTANCE OF ADVERTISING.

The value of advertising is so well understood by old established business firms that a hint to them is unnecessary; but to persons establishing a new business, or having for sale a new article, or wishing to sell a patent, or find a manufacturer to work it: upon such a class, we would impress the importance of advertising. The next thing to be considered is the medium through which to do it.

In this matter, discretion is to be used at first; but experience will soon determine that papers or magazines having the largest circulation, among the class of persons most likely to be interested in the article for sale, will be the cheapest, and bring the quickest returns. To the manufacturer of all kinds of machinery, and to the vendors of any new article in the mechanical line, we believe there is no other source from which the advertiser can get as speedy returns as through the advertising columns of the SCIENTIFIC AMERICAN.

We do not make these suggestions merely to increase our advertising patronage, but to direct persons how to increase their own business.

The SCIENTIFIC AMERICAN has a circulation of more than 42,000 copies per week, which is probably greater than the combined circulation of all the other papers of its kind published in the world.

NEW BOOKS AND PUBLICATIONS.

THE AMERICAN GARDEN, a Monthly Illustrated Journal devoted to Garden Art. Edited by James Hogg. Terms $2 a year. Brooklyn, N. Y.: Beach, Son, & Co., 76 Fulton street.

This excellent journal is now in its third year, and the issue for September, 1874, commences a new series. It has been placed under the editorship of Mr. James Hogg, whose renown as a gardener and as a writer on his art, in its many and varied aspects, is widely extended. We predict an extended circulation for this periodical, under the new management.

TITUSVILLE, OIL CITY, AND FRANKLIN DIRECTORY FOR 1874. Compiled by J. H. Lant, Titusville, Pa.

Recent American and Foreign Patents.

Improved Construction of the After Hulls of Yachts, etc.

Empson E. Middleton, Southampton, England.—This invention has for its object to increase the capacity of vessels for carrying cargo or ballast, to enable them to carry more canvas to improve their sailing qualities, and to make them safer in rough weather and in heavy gales of wind. The invention consists in the arrangement of the stern post of yachts and other vessels with its lower end inclined to the rearward at an angle of 45°, more or less, in connection with a corresponding rearward extension of the keel.

Improved Saw Gummer.

Jason W. Mixter, Templeton, Mass.—As gumming machines have been heretofore constructed, the carriage ways are cast on the machine, so that the carriage and cutter cannot be adjusted to alter the direction of the cut; and the cutter being placed upon the end of the shaft, but one journal bearing and but one crank can be used. In the present device, by attaching the carriage and cutter shaft and feed screw to an adjustable "way" frame, the operator is enabled to vary the direction of the cutter so as to cut more toward the center of the saw, if desired. The cutter shaft is supported by an outer bearing on a curved arm. Two cranks may be used instead of one for operating the machine, which may be applied to either straight or circular saws, and without taking the latter from their arbors. The cutter is made detachable, so that it may be changed to adapt it to the diamete or size of the saw.