laws, well disciplined armies, systematic civil polity, religion and ornamental art. Several thousand years elapsed before this beneficent industrial spirit, which had first taught the savage to fashion tools of stone and then elevated him to the bronze age, raised him to the age of iron by teaching him to smelt, forge, temper, and weld the most useful of all the metals. If the useful arts had done nothing for man but to teach him how to work stone, bronze, andiron, they would deserve the credit of laying the indispensable foundation of all our culture, and thus doing more for us than any other branch of human employment has done. But their service did not cease there. It has continued and still continues with increasing beneficence. If we divide culture into a dozen eras instead of three, the stone, bronze, and iron ages, we should have to designate nearly all of them from industrial events. The sailing vessel, the mold board which turns over the furrow of the plow, the water wheel, the magnetic needle, gunpowder, the paper mill, movable type, the spinning wheel, the telescope, the quadrant, the chronometer, the steam engine, the steam boat, the steam railroad, the steam blast in smelting furnaces, the puddling furnace, the rolling mill, the labor-saving machinery of a thousand kinds—these are triumphs of industry, and the main causes of the superiority of modern over ancient civilization. It is the workingman, not the soldier, the priest, the statesman, the philosopher, the scientist, the artist, or the author, who has given us not only the foundation, but also most of the superstructure, of our culture.—*Overland Monthly.*

TO NEW SUBSCRIBERS.

All subscriptions to the SCIENTIFIC AMERICAN will be commenced with the year, unless persons, at the time of remitting, request to the contrary. Nearly all subscribers preserve their numbers for binding; and in most cases where subscriptions are received during the first quarter of the year, if the back numbers are not sent, they aresubsequently ordered. To save both the subscribers and ourselves trouble, the back numbers from January 1 will be forwarded, unless we are advised to the contrary. This course will be pursued till April 1, after which date the paper will be sent from the time of receipt of remittance; but subscription. may commence at any time, at the request of the subscriber, The above regulation applies only to those who give no instructions, at the time of remitting, as to when they desire to commence.

Death of the $40,600 Cow.

The celebrated Eighth Duchess of Geneva, the short horned cow to which we have already referred as bringing the enormous price of $40,600 at the sale of Mr. Campbell, at New York Mills, recently died in giving birth to a calf. It will be remembered that the animal was purchased through a mistake by the agent of a noted English cattle breeder, and subsequently resold to Col. Lewis G. Morris, of Fordham, N. Y., for $30,600. The loss is not only a heavy one pecuniarily, but a severe disappointment to the latter gentleman, as it was his object to use the cow as a means of materially improving the breed of short horned cattle in the United States. Col. Morris has still a large fortune invested in choice stock.

NEW BOOKS AND PUBLICATIONS.

HEAT AS A SOURCE OF POWER, with Applications of General Principles to the Construction of Steam Generators. By William P. Trowbridge, Higgin Professor of Dynamic Engineering in the Sheffield Scientific School of Yale College. Price $3.50. New York: John Wiley & Son, 15 Astor Place.

Professor Trowbridge has succeeded in producing a work which, we think cannot but be of much benefit to every student of mechanical engineering. It is intended as an introduction to "The Study of the Steam and other Heat Engines," and, as its title indicates, is devoted to the careful discussion and thorough elucidation of the steam generator. The various types of the atter are fully considered, and their theoretical and practical construction explained. The initial chapters on heat, combustion and fuel, are admirable treatises on their respective topics, clearly written, and containing the the most approved formulæ and rules. There are numerous illustrations and a brief appendix, with tables, &c. The volume is eminently practical in its tendency, and will form a valuable hand book for the professional engineer.

THE CONSTANTS OF NATURE. Part I. Specific Gravities, Boiling and Melting Points, and Chemical Formulæ. Compiled by Frank Wigglesworth Clarke, S. B. Washington, D. C.: Smithsonian Institution.

A volume of tables, compiled with great labor and research, of the gravities of nearly all known elements and compounds. The work is thoroughly well done, and the book will be found useful in every laboratory.

BUILDING CONSTRUCTION: BRICK. BUILDING CONSTRUCTION: TIMBER. Each Two Volumes (Text and Plates). By Robert Scott Burn, C. E., Author of "The Handbook of the Mechanical Arts," etc. Each Volume, 75 cents.

INORGANIC CHEMISTRY, for Use in Science Classes and Higher and Middle Schools. By W. B. Kemshead, F.R.A.S., F.G.S., Lecturer at Dulwich College, London. 75 cents.

ELEMENTS OF ZOOLOGY, for Schools and Science Classes. By M. Harbison, Head Master of the Newtownards Model School. 75 cents.

These volumes form parts of the admirable "Elementary Series" issued by Messrs. G. P. Putnam's Sons, corner of Fourth avenue and 23d street Like the previous volumes published under this head, they are practical, lucid, and concise, and may be relied on as accurate treatises on their respective subjects.

Messrs. B. K. Bliss & Sons, of 23 Park Place, New York city, forward us the nineteenth edition of their illustrated spring catalogue of seeds, plants, etc., with supplement for 1874. The book contains a descriptive list of some 2,000 varieties of flower and vegetable seeds, a number of beautifully colored lithographs of flowers, etc., find an immense number of excellent engravings. There is beside a large amount of valuable information upon the subject of gardening generally, which will render the volume a useful guide both to the amateur and the professional gardener. The price is but 25 cents. The same firm also issue an abridged catalogue containing an almanac for the year and useful hints for every month. This is mailed on receipt of two three-cent stamps. The catalogue of potatoes for seed, which is forwarded free, has practical remarks on potato culture and full descriptions of many new and excellent varieties. The advertisement of the above enterprising firm will be found on the last page of this issue.

PATENT OFFICE DECISIONS.

United States Circuit Court—District of Massachusetts.

ADAMS ELECTRO-NICKEL PATENTS.—UNITED STATES NICKEL COMPANY *vs.* N. SHEPARD KEITH.

[In equity.—Before Shepley, Judge.—October Term, 1873, to wit, February 13, 1874.]

The defendant is charged with infringement of letters patent of the United States, granted to Isaac Adams, Jr., for "improvements in the electric deposition of nickel," dated August 3, 1869, and May 10, 1870, both of which patents have been duly assigned to the complainants.

Respondents deny the infringement, and allege that Adams was not the original and first inventor of what is claimed as his invention in either of the patents.

The history of the state of the art of electroplating with nickel, or what should with more propriety, in view of the progress then made in the art, be denominated the electro-deposition of nickel, prior to the discoveries of Dr. Adams, is sufficiently given, in the opinion of this court, in the case of United Nickel Company *vs.* Anthes. *Official Gazette*, vol. I., p. 578, not to require repetition here, otherwise than by reference to, and reiteration of, the views expressed in that case. Much additional evidence has been introduced in the record in this case upon the issue of novelty. Yet, after a careful review of the whole evidence, both in relation to what was alleged in that case as anticipating the discoveries and inventions of Dr. Adams, and is again alleged in this record, accompanied with further proof, as well as what additional and new matter is here introduced. I am confirmed in the conviction that the electro-deposition of nickel by means of the described solutions prepared and used, as described in his patents, and of such an anode as his patents describe, was unknown in any practical application of it to the useful art of electro-plating of metals, prior to the discoveries of the patentee. By electro-plating of metals as a useful art, I mean the uniform, continuous, and coherent deposit of one metal upon the surface of another, so as to produce a coating of the desired thickness, purity, uniformity, coherence, and permanency of adhesion, as distinguished from the mere electrolysis or electro-deposition of a metal out of a solution, whether such electro-deposition be or be not on the surface of another metal. And herein, in my view, consists the difference in the state of the art prior and subsequent to the discoveries of the patentee. Prior to his discoveries and inventions, electroplaters and electro-metallurgists well understood how desirable a result it would be to be able to plate the surface of base metals with a coating of nickel, resembling silver in luster and color, without its liability to tarnish on exposure to the air. Yet while it was thus well understood, as stated by Napier, that if the practical difficulties could be overcome, "the application of nickel to the coating of other metals would be extensive, and the property of not being able to tarnish would make it eminently useful for all general purposes; yet, with all the research and investigation which have been so lavishly bestowed on this case, the respondents have signally failed to show that electroplating of metals with nickel had any practical existence as accessible or beneficial to the public before the date of the inventions of Dr. Adams. Since that time, under the processes described in his patent, the art is so extensively practised, both in this country and Europe, that, as stated by one of the witnesses in this case, it would be less difficult to name articles used in the mechanic arts which have never been nickel-plated than those to which nickel-plating has been applied. The claims in the two patents are as follows: In the patent of August 3, 1869:

1. The electro-deposition of nickel by means of a solution of the double sulphate of nickel and ammonia, or a solution of the double chloride of nickel and ammonium, prepared and used in such a manner as to be free from the presence of potash, soda, alumina, lime or nitric acid, or from any acid or alkaline reaction.

2. The use for the anode of a depositing cell of nickel, combined with iron, to prevent the copper and arsenic which may be present from being deposited with the nickel or from injuring the solution.

3. The methods herein described for preparing the solution of the double sulphate of nickel and ammonium.

4. The electroplating of metals with a coating of compact, coherent, tenacious, flexible nickel, of sufficient thickness to protect the metal upon which the deposit is made from the action of corrosive agents with which the article may be brought in contact.

Also, but which is not involved in this suit—

5. The deposition of electroplates of nickel, to be removed from the surface on which the deposit is made, and used separately therefrom.

In the patent of May 10, 1870, the claims are as follows:

1. The combination with nickel to be used for anodes, of a metal or metalloid, electro-negative to the nickel in the solution displayed.

2. A nickel anode, combined with carbon and cast in the required form.

As the respondent has infringed the patent of May 10, 1870, by the use of anodes in the electro-deposition of nickel, substantially like those described and claimed in that patent, and has also infringed the first claim of the patent of August 3, 1869, by the use, in the electro-deposition of nickel, of a solution of the double sulphate of nickel and ammonia, prepared and used in such a manner as to be free from the presence of potash, soda, alumina, lime, or nitric acid, or from any acid or alkaline reaction, it is not necessary to decide the questions presented on the constructions of the fourth claim of the patent of August 3, 1869.

In deciding that the evidence in the record proves an infringement of that patent by the use of the solution therein described, I do not overlook the fact that respondent's solution contained one one-thousandth part of tartrate of ammonia, and one eight-hundredth part of ammonia.

The evidence in the case satisfies me that in the defendant's solution the first was an inert substance, and the second would be, and was, speedily eliminated from the solution in use by evaporation.

Decree for injunction and account as prayed for in the bill.

DECISIONS OF THE COURTS.

United States Circuit Court—Southern District of New York.

PATENT PAPER BAG MACHINE.—THE UNION PAPER BAG MACHINE COMPANY *et al. vs.* G. L. NEWELL AND G. H. MALLARY.

[In equity.—Before Blatchford, Judge.—Decided November 26, 1873.]

This is an application for a preliminary injunction, to restrain the defendants from infringing letters patent granted September 12, 1865, to Benjamin S. Binney, assignee of E. W. Goodale, the inventor, for a "machine for making paper bags." As the claim of infringement on this application is confined to the first claim of the patent, only such parts of the specification need be referred to as relate to that claim. The specification says:

"This invention consists, first, in giving to the side cutters an irregular curve at or near their inside ends, in such a manner that the form of the paper cut by their action, and the corners produced by folding said paper, are of such a shape that the paste shall come upon the paper where it is single, and thus be enabled to hold better than it does when it is applied in the ordinary way.

It designates as "side cutters" the cutters "which serve to cut the paper so that the sides may fold and make the seam in the center of the bag." It says that

These cutters or knives are bent in an irregular curve near their inner ends, so that the paper cut by their action, and the corners produced by folding said paper, are such that the paste shall come upon the paper where it is single, and that it will hold better than it does when applied to the paper in the usual manner.

One of the figures in the drawings contains lines which are said, by the specification, to designate the cuts made by the side cutters. The first claim is in these words:

Making the side cutters, B, with curved ends, substantially as and for the purpose set forth.

In the defendants' machine there are cutters which serve to cut the paper so that the sides may fold and make the seam in the center of the bag. They are side cutters. They make a cut of a definite length from the outside edge of the paper inward toward the center, so as to leave flaps or side pieces, which are then to be folded over from each side toward the center, overlapping each other at the center, and making a seam in the center. The defendants' side cutters are not straight or unbent in their whole length, nor are they bent at an angle near their inner ends; but they are bent in a curve near their inner ends. The effect of this curve is that, when the side pieces are folded over, the central end piece, of a single thickness of paper, may be pasted down without folding over, in addition to such single thickness, any part of the double thickness formed by folding the sides, and yet the corners will be perfectly close and tight. This result is due to the curve near the inner ends of the side cutters in contradistinction to an angle there. Where the cutters have an angle there, and the central end piece, of a single thickness, is pasted down without folding over. In addition, any part of the double thickness, there are holes or openings at the corners, and, to make tight corners, it is necessary to fold down part of the double thickness, and then the paste can only come upon the inner one of the two thicknesses, while the outer one, not being held to the inner one, tends to draw the inner one away from the surface to which it is pasted. This is precisely what is done by the patentee's arrangement, and what he describes in the specification as the result of his arrangement, when he says that the form of the paper cut by the curved side cutters and the corners produced by folding said paper, are of such a shape that the paste shall come upon the paper where it is single, and thus hold better than when applied to the paper in the usual way. The language of the specification is not very artistic, and the idea sought to be conveyed is not as well expressed as it might be; but the meaning cannot be mistaken, when read in view of the state of the art by a person skilled therein.

It is to be noted that the body of the specification speaks of the curve near the inner ends of the side cutters as being an irregular curve, and that the claim drops the word "irregular," and claims making the side cutters "with curved ends, substantially as and for the purpose set forth." It is contended by the defendants that the drawing of the patent shows the cut made by the side cutters as being, for its whole length, of a form of curve which may properly be called irregular, as a whole, and that the defendants' side cutter is straight for most of its length, and of a regular curve near its inner end. But this is immaterial. It is not shown that any side cutter with a curved inner end, for the same purpose, existed before. That being so, any degree of curve to the inner end of the cutter, which will produce the result described, is within the claim, and must be regarded as an irregular curve, whatever the word "irregular" may mean. Nothing but a curve will produce this effect. An angle will not. The patentee was the first to use the curve. The form of curve represented in his drawings will produce the effect. His claim speaks merely of "curved" ends. Hence any curved end which will produce the result is his curved end.

It is contended for the defendants that, as the patent sued on was issued under the authority of the act of July 4, 1836, (5 United States Stat. at Large, 117,) and as that act is repealed by the 111th section of the act of July 8, 1870, (16 id, 216,) such repeal vacated and made void the said patent; and that, if this is not so, yet no suit can be maintained upon said patent for any cause of action which accrued after the 8th of July, 1870, as did the cause of action in this suit. The 111th section of the act of 1870, which repeals the act of 1836, contains the proviso that "the repeal hereby enacted shall not affect, impair or take away any right existing under the repealed act, "but all actions and causes of action, both in law and in equity which have arisen under" said act, "may be commenced and prosecuted, and, if already commenced, may be prosecuted to final judgment and execution in the same manner as though this act had not been passed, excepting that the remedial provisions of this act shall be applicable to all suits and proceedings hereafter commenced."

The rights created by, and arising under, a patent granted under the act of 1836, are rights existing under that act. The proviso declares that the repeal of that act shall not affect, impair, or take away such rights. A right granted by the patent in suit is the exclusive right to make and use and vend to others to be used, the inventions claimed in the patent. Such right was a right existing under the act of 1836 on the 8th of July, 1870. The right to sue after the latter date for infringements of the patent committed after that date, may in one sense, be said not to have been a right existing on the 8th of July, 1870, because the cause of action had not then arisen. But the grant held under the patent was a right, and a vested right. Such grant, it was intended, should continue till it should expire by its limitation. This is apparent from the provisions of the 63d and 64th, 65th and 66th sections of the act of 1870, which enact that patents granted prior to March 2, 1861, (and which were patents for fourteen years) may be extended for seven years beyond the original terms of their limitation.

It is further urged that the wording of the proviso to the 111th section of the act of 1870 is such that the only right saved is the right to prosecute actions and causes of action which arose prior to July 8, 1870, on patents theretofore granted. No reason is assigned why, if such prosecutions are allowed, they should not also be allowed in respect of causes of action arising on or after July 8, 1870, on such patents. But the point taken is rested solely on the fact that the enactment in reference to prosecutions is introduced by the word "but;" and it is maintained that the effect of the use of that word is that the rights declared in the preceding part of the proviso to be not affected, are limited to the actions and causes of action afterward specified, that is, to such as arose before July 8, 1870. No such effect, however, can properly be given to the use of the word "but" The first part of the proviso, as already stated, has the effect to keep in life the patent and its grant. But actions has been brought and were pending on existing patents, which had not been sued on, and the provisions of all prior existing acts in regard to suits on patents were being repealed. Hence, the necessity of providing that such actions and causes of action might be prosecuted in the same manner as though the act of 1870 had not been passed. But the proviso goes on to declare that the remedial provisions of the act of 1870 shall apply to all suits thereafter commenced for causes of action existing on the 8th of July, 1870, under patents previously granted. It leaves existing suits to be conducted according to the remedial provisions prescribed by the prior acts. There remain, however, suits to be brought on causes of action arising on or after July 8, 1870, on patents theretofore granted. The proviso does not apply to the manner of conducting such suits. The existing patents and the grants of right in them, being saved by the proviso, a reference to prior sections of the act shows that those sections apply to then existing patents, and to suits to be brought thereon, for causes of action to arise on or after July 8, 1870, as well as to patents to be issued under the act of 1870, and to suits to be brought thereon. Thus the 53d section, in regard to reissues, embraces reissues of existing patents. If not, as all prior acts are repealed, there could be no reissues of such patents. The same is true of the 54th section, in regard to disclaimers, and of sections 55, 56, 58, 59, 60, 61, and 62, in regard to suits. Full authority is given by the latter sections for bringing this suit.

As to the alleged licenses set up by the defendants, it was fully considered and passed upon in a former suit in this court, between the parties to this suit, where it was held, on final hearing, that such license had no valid existence, as a license, in the hands of the defendants, as against the Union Paper Bag Machine Company, and persons holding under them.

Nothing is shown to affect the novelty of the first claim of the patent sued on, the infringement is clear, and the case, on all points, is one entirely free from doubt.

The injunction asked for must, therefore, be granted.

George Harding and Fisher & Duncan, for plaintiffs.

Marcus P. Norton, for defendants.

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.

Recent American and Foreign Patents.

Improved Locomotive Driving Wheel.

Joseph C. Wilson, Oshkosh, Wis., assignor to himself and Mahlon P. Barry, same place.—This invention consists in a driving wheel formed of an inner and an outer wheel, of which the former sustains the weight of the locomotive on its hollow shaft, and revolves along the inside of the tyre of the outer wheel, the solid shaft of which passes through the hollow outer shaft. The addition of the hollow shaft, it is claimed, adds greatly to the strength of the locomotive axle, and the working of the inner wheel in the outer increases the driving power considerably by economizing in the wear and tear of the tyre, and otherwise.

Improved Apparatus for Converting Motion.

Romulus R. Stevens, Stockton, Cal., assignor to himself and Lewis M. Cutting, same place.—This invention consists of a reciprocating toothed bar above the axis of the shaft to be driven, and another below it, in different planes, connected together by yokes. With these are combined a toothed wheel on the shaft, and apparatus for shifting the bars at each end of the stroke to change them, so that one turns the wheel going one way, and the other when going the other way, thus giving continuous motion to the wheel. The invention also consists of a cam and spring, so combined with the shaft as to expend some of the excess of the power of the piston at mid-stroke on the spring, and return it to the shaft during the latter portion of the stroke, when the effect of the steam is diminished, to equalize the application of power. By this arrangement, it is believed, power may be largely economized, because the application of it is always at the rims of the toothed wheels; also because the balance wheel is dispensed with, and the engine enabled to run slower, as compared with the speed of the driving shaft.

Improved Pump.

Thomas Wilmington, Ossian, Ind.—This is a double acting lifting pump, having two cylinders made in a block of wood, with a metallic water chamber above the cylinders, or resting on the block. A plate on top of the chamber has a valve orifice, which is closed by a valve. Above the valve is another metallic chamber, which is covered by a plate, to which the delivery pipe is attached. The lower valves are seated on the plate beneath the block, to which plate the induction pipes are attached. The bucket rods pass through stuffing boxes, and extend up to the top of the stand, where they take hold of the ends of two vibrating bars. The bars work on a pivot rod, which passes horizontally through the top of the stand, and their ends extend back from the pivots, and enter loosely the ends of the cross of the working lever. The working lever is vibrated on the pivot in the top of the stand, and motion is imparted to the pistons thereby.

Improved Boot Pac.

James A. Weaver and William B. Hawkins, East Saginaw, Mich.—The sole leather boot pacs worn by lumbermen and other woodmen, and known as "tongue pac," have heretofore been made with seams at the quarters; also with seams from the top of the upper, a little each side of the instep, along the sides of the top of the foot, to the top of the toe, thus making the upper of three pieces, which require several seams for sewing them together. It is now proposed to make the whole upper in one piece, which is joined together at the heel by one short seam only. The latter is thus located where it is so re-enforced and stiffened by the counter that it is not so liable to open and leak when the leather is water-soaked. The leg is sewn to the upper, so that its seam does not join the upper at the seam of the heel of the latter, so that the tendency to open at the junction is lessened.