RECENTLI PATENTED INVENTIONS. Engineering.
Gas or Vapor Engine.-Eugene P Woillard, Sugden, Fla According to this invention an
explosive engine is provided having high pressare cylinexplosive engine is provided having high pressare cylin-
ders with reciprocatiog pistons, a low pressure cylinder with a piston rigidly connected to one of the high pressure pistons, the working chambers of the low pressure cylinder and the corresponding high pressare cylinder being between the respective pistons, and the exhaustfrom
the high pressure cylinders aischarging into the low pressare cylinder. It is designed to utilize the motive agent expansively to the fullest advantage in a double one direction and a low pressure or compound expansion impulse in the other direction, so that every stroke is
working stroke.
Steam Boiler.-John B. Fleming, Frisco, Utah. Two horizontal shells, with a furnac with feed water from a feed water heating and purifying being fire tubes in the heting and purifying shll, and the water being thrown from a pump into this shell in the form of a spray to cause the separation of rities. Blow-oat pipes are provided for removing sedi ment or scam from the heating and parifying shell, and when it is not necessary to heat and punfy the feed wate the shell may be conveniently cut out of operation by
valves provided for such purpose.

Drive Wheel Brake Release. Walter O. Pelham, Denison, Texas. This is an improve provides an automatic valve mechanism arranged in the notive steam chest, the mith a pipe leading to the loco adapted to catablish communication between the brak pipe and the oater air. The improvement is applicable
to air, steam, or vacuum brake systcms, the brakes being to air, steam, or vacuum brake systcme, the brakes being
instantly released at the time the train la in motion and before the braked drive wheels are on the point of sliding on the r

Valve. - George W. Graffin, Allenown, Pa. A valve adapted to make a tight closure, an orking parts withoat dispensing with the valve, has been devised by this inventor. The improvement comprises a valve casing having inlet and
outlet and valve seat at the inlet, two valves proper movably mounted in the casing and adapted to be seated o the valve seat, guideways in which the valves loosely
slide, extending from one end of the casing to the other, asidable stem for each valve and a ball and socket joint or connecting each valve with ite valve stem, while by either of the valves.

## Railivay Appliances.

Car Axle Lubricator.- James S. Pasten, Baltimore, Md. This is a device adapted for ready comprises a plate spring of novel construction adaptod to sapport at its rear end a dust guard at the rear end of the box and a wiper bearing on the ander side of the axle, the spring aleo supporting on its central portiou a roller which bears apon the axle while its lower edge is always immersed in the oil. The spring is of nearly the same width as the oil chamber, and its front end is bent ap to form a hood, preventing oil from
reaching the axle box lid. The spring in position normaliy servee as an oil baffe, in addition to its other functions, but is sufficiently fiexible to be readily removed, with its attachments, from the axle box.
Railway Track Sleeper Thread Cuttrr.-Albert Collet, Paris, France. A boring tool for screw cutting the holes aready made in railway sleepers for fastening screws, although it may be em-
ployed for screw cutting cylindrical holes in wood generally. The tool has a cylindrical cavity and an exterior thread, and a removable cutting part is dovetailed int
its body and held in place by a metal strap. The tool transverse hole for the escape of the chips.

## Electrical.

Water Registering Device. Samuel J. Evans, Elkhorn, West Va. For indicating
and registering the height of water in a tank or similar in an electric circait is closed by means of a float conrolled by the water in the tank, a registering mechansm being also operated accordingly at any convenient point. The mechanism is also designed to sound a high and low water alarm, the pointer of the registering de-
vice indicating on a dial the raising and lowering of the vice indicating on a dial the raising and lowering of
water in the tank or reservoir by successive steps.
Igniter for Gas Engines.-Harry S . Dosh, Baltimore, Md. An igniter designed $\omega$ operate
saccessfally and with certainty and aniformity with a single battery cell has been devised by this inventor. It comprises two electrodes having their ends formed as plates, which lie suffliently close together to cause by their separation a rarefaction of the gaseous medium be. tween them. The invention thus affords a means of creating in the gas cylinder a partial vacuum or reduced
pressure between the spark electrodesand simultaneously transmits through this more tenuous mediam of gas and air the electric spark, which permits the use of a very
Electric Railiway Sistem. - Lawrence K. Devlin, Havre, Montana. This invention is for an improvement in systems where the trolley is adapted
to run on a sectional contact rail, in a slotted conduit, a run on a sectional contact rail, in a slotted conduit, feed wire, the sections of the contact rail being put in commanication with thefeed wire by contact devices ac-
taated by the movement of the car. One of the track rails forms one side of the condait wherein the trolley o
the motor car travels, an inclined slotted rail forming the pen at its bottom. Track wores are inserted at suitable ntervals between the ends of the slot rail sections, an pivoted projecting levers are connected to the adjacen

## Bicycles, Etc

Mechanical Motor for Bicycles, rc.--Charles P. Labatt, Los Angeles, Cal. A nove according to which the driving gear comprises elidin pedal levers in connection with a gaide box having a there being a pivoted spring-presesed tongue at each end of the partition and a stad projecting from the levers and a ternately moving through the raceways. The levers have geared connection with the rear traction wheel, and th
improvement is also designed to facilitate the driving mall stationars machines of different kinds.
Electric Bicycle Lamp. - Malcolm . Ryder, Westfield, N. J. This invention provides n incandescent lamp by a novel current collector with generator being actuated from the tire of the wheel, and being supported to rock on projections from the frame The current transmitter comprises an elastic-limbe brush held in an insulating holder block by a centra screw and a nat held from tarning by the flanges of the older block, the brush having enforced contact with carrent collector ring forming part of the generator. Th
improvement is also adapted for use on vehicles othe than bicycles.

## Mining, Etc

Concentrator and Amalgamator. - Angns McKellar, Salt Lake City, Utah. To sift fine or basin, according to this invention, receives the man rial from a screening surface, and a hopper beneath takes the material from the pan, while a cylinder with mercary in its bottom is connected by a pipe with the hopper. valve in the lower portion of the cylinder is connected with a pipe throagh which the mercary and the materia carries may be withdrawn from the valve casing
The machine is of simple, darable and inexpensive con struction, and is designed to automatically and thor oughly remove from the screen
the macbine all coarse material.

## Mechanical.

Mechanical Movement. -Julius Manigold, Dexter, N. Y. A movable stool and a swingmonanted on certain means by which the motion from the stool and lever are synchronized and regalarly transmitted from the apparatus to a rotary crank shaft
or other device to which motion is to be imparted. One or other device to which motion is to be imparted. One
seated on the stool graaps a hand pin passing through a ever, and, bearing on the pedals, rocks back and fort ausing the stem on which the eeat is mounted to.r power is applied at three points-at the stool, at the pin, lever and link.

## Agricaltaral.

Hay Rake. - Benjamin Mellinger, To peka, Kankas. In a horse hay rake this invention pro gathered from being epilied at the ends of the row of eeth, a cleaning device being also provided for the teeth, operating in connection with a lever to raise the
teeth. The gaard comprises a shield formed of adjustale sections attached to and projecting cearwardy from he rake head, spring teeth being rearwardly and drwnwardly curved from the shield over the space between head. A sabstantially straight and rigid tooth is located
Churn. - Jakob Widder, New York City. Within the cylindrical casing or body of this
churn Is a flred hollow cone at the top, between which and another similar cone at the bottom of the casing the dasher is reciprocated, the dasher also being conical and end by a helical spring. so that the dasher is normally held ap within the apper cone. As the dasher is re ciprocated, the cream is violently compressed between
the cones and forced through the perforations of the the cones and forced through the perforations of the
dasher as so many streams or currenta, causing the quick ormation of batter.

## Miscellaneous.

Brick Die.-Clarence M. Steele, Statesvill, N. C. A die designed to form the greatest variety or lays with the least friction is afforded by this invention, the die having polished metal sarfaces uhrongh which the clay is forced, forming it into bars for making
brick. The die is composed of two die sections, a partition and a cylindrical shell or casing, the latter having a steam inlet and an outlet, with valves controlling the outward strrin upon the dies. and the several parte mas be easily dressed oat and polished, and securely pat to ether with only two bolts and cap screw.
Bristle W ashing Machine.-Charles E. Tyler and James Dempster, Halifax, Canada. To
clean a large number of bandles of bristles simaltane onsly and to permit of removing a washed bandle of bristles and replacing it by an unwashed bundle durin ${ }_{\text {m }}$ the washing operation, this machine is made with a re the comb, and adapted to carry the bristles and bring them into the path of the comb teeth. The comb is mounted to slide on the bottom of a liquid receptacle,
and the comb teeth pass in every direction throagh the and the comb teeth pas
bristles in each bandle.
Piston Faucet.-Edwin R. Greene, Providence, R. I. A faucet for drawing beer, ale, etc.,
and arraged to provent a largo amount of uquid from
standing in the faacet, has been devised by this inits outer end, the cap having an inwardly extending cupshaped bearing through which the piston rod extends to the inner end of the fancet barrel. A collar near th outer end of the rod reste against the cap-shaped bear
ing when the piston is flush with the inner end of the barrel, the barrel of the faacet being then completely mptied when the fancet is closed.
Pocket Knife.-Alexander Normand Elerksdorp, Soath African Republic. This knife ha nuickly remable blades to permit the user to readily and quickly remove one blade and sabstitute another, or work in hand. The handle has two pivots especiall small tools provided fo are with the tool, one of the small
Book Supporter.-Henry L. Pinney nd Franklin Leazner, Cass City, Mich. A device for ithout marring them, and adjusted to different height positions or angles, consists, according to this invention, of an adjustable pivoted arm which carries a board for ne sapport of a book, with means for adjusting it near the apperedge of the board. The device may b conventently swang in or oat, closer to or futher awa rom the reader, and will hold the book from an almos at to a nearly verti
Harness Shaft Tug.-William Faw ett, Brooklyn, N. Y. The frame of this tug is forme of a single piece of metal, curved at its lower portion to
form a shaft sapport and bent over with a loop and pin here being an adjacent loop to engage the belly band The inner portion of the frame forme a buckle, with tw pins, one above the other, one of which engages
movable tongue. The tng can be very cheaply manu actured and
Dress Skirt Lifter.-Esther Man ing, No. 2273 Seventh Avenue, New York Citg. This ing, No. 2273 Seventh Avenue, New York city. oade to lift the rear portion only of the skirt. vice consists of tapes extended one from each breadth seam of the skirt and extended through guide rings along the seams and terminating in two tapes which are pro be amitneously drawn to lift the bottom of skirt. The device has met with ready sale-a fact whic
skim proves its atility.
Meat Shaver. - Caleb R. Turner
MEAT SHAVER. - Caleb R. Turner,
Brooklyn, N. Y. To facilitate the shaving or slicing of meat in a neat and expeditions manner, this inventor has perfected a device of simple and darable constrac-
ion, arranged to properly feed the meat to the slicing o shaving knife, and permit the operator to regalate the eed for thinner or thicker slices. It has an $L$-shaped roagh to receive the meat, and a standard at the fron handle to draw the conting edge of a segmental knif cross the meat, a longitadinal carrier or pusher moving the meat forward bodily or pushing it in the trongh to ward the knife. By the shifting of a nat, less or more feed may be given to the carrier, and a ${ }^{a}$ gate at the front
end of the trough protecta the operator from getting his end of the trough prote
fingers ander the knife.
Cover for Washtubs, etc. - Mark Delaney, Union Hill, N. J. This cover is preferably having each a longitudinal groove in its inner side edge, gether a bars or cleats. Tongues on the end portions of the eaves fit in grooves on the inner side edges of the cleats o withstand to a maximum degree the effects of steam, mpness and water without warping.
Note.-Copies of any of the above patents will be
fornished by Mann \& Co. for 10 cents each. Please end name of the patentee, title of invention, and date send name of
of this paper.

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planation and mathematical analysis of engine efficiency on the lines of heat energy as representative in the Carnot cycle. The diagrammatic display of the details of engine efficiency so gratifying to the eye is made the principal object in the illustrations in the booklet
and the full working chart of volume and temperature and the full working chart of volume and temperature
carves accompanying the work. A schedule blank is carves accompanying the work. A schedule blank
also detailed on the diagram sbeet in the order servation and as a guide to aniformity in the work of engine testing. An excellent stady sheet for expert work.
The Aeronautical Annual, 1897. Devoted to the encouragement of ex periment with aerial machines, and aerodynamics. Edited by James
Means. Boston. Mass.: W. B. Clarke M Company. Pp. 178. 8vo. Paper.
Price $\$ 1$.

The Aeronautical Annual is always a welcome visitor surpases in interest those which have preceded it. It is got up in the same handsome style and is profusely mastrated. The contributors inclade Dr. S. P. Langley,
Octave Chanate, Otto Lilienthal, Hiram S. Maxim and others. The progress in aeronaatices in 1896 was very marked, the development being chiefly along three lines: Finst, the development of the self-propelled aerodrome
pecond, the development of the motorless air gailer peciond, the development of the motoriess alr हailer
thisd, the development of the motor. Euch of thene de
partments has nowa well defined point of vantage which accesible to every inteligent experimenter who so as to thoroughly anderstand the results reached. Among the interesting articles in the present namber ar "The Aerodrome in Flight," "Recent Experiments in Gliding Flight," "The Best Ship for Wings," "The Way of an Eagle in the Air," "Screw Propellers Work-
ing in Air," "Blae Hill Measuremente of the Velocity of ng in Air," "Blae Hill Measuremente of the V elocity of
Flying Ducks," etc., and biographical notices of Samuel Pierpont Langley, Ph.D., LL.D D.C.L and Ott

The Steam Engine Catechism. A direct of direct practical questions answers to direct practical questions, mainly in tended for young engineers and for
examination questions. By Robert
Grimshaw. Eleventh edition. New York : Norman W. Henley \& Com which is a a Iofactory indication of the value with which the book held. The popular question and answer form is retained,
and the questions are answered in a remarkably lucid manner. The tables of calculations are very clear. Th work is provided with an excellent index.
Architectoral Drawing for ME prehensive trich. P. Heks. A colu drawing for building mechanics showing the learner how to proceed step by step in every detail of the
work. New York : David Williams. work.
1897 . Pp. 94 . Price $\$ 1$.
This is a comprehensive treatise on architectural draw ng for bailding mechanics, showing the learuer how to proced step by sep in every detall of he work. Even uperficial examination of this work will satisfy the
reader that it is written by one who thoroughly ander tands the needs of the beginner in architectural drawin and especially the building mechanic. It is not intende or architects proper, hut it is for the use of bailders and those who execute the designs of architects. The popu-
larity with which the author's other work, entitle Bailders' Gaide," has been received has brought many etters of inquiry, which have been convincing proofs o he wants and needs of the mechanic for a work of the most warmly.
The Induction Coil in Practical WORK, INCLUDING ROENTGEN X
RAYS. By Lewis Wright. London:
Macmillan \& Company, Limited. New York: The Macmillan Company.
1897. Pp. 172. Price $\$ 1.25$.
A work by such an eminent physicist as the author of "Light" and "Optical Projection" will certainly com-
mand attention. It is written simply and solely as a mand attention. It is written simply and solely as a
practical help. to the efficlent and safe use of an induc-
tion coil, with especial reference to the extensive use in urgical and physiological work with Roentgen raye This new fleld of experiment has brought many into personal contact with coils who have never had any acquaintance with such instrumenta before. Not a few of uch have actually stated their need of such informaton as ichs here altempted to sapply, and in is thought that some will like to have an outline of the many experiments in which the induction coil beara a part.
work is illustrated with well selected engravings.
Eighteenth Annual Report of the STATE HOSPIT THE BINGHAMTON N. Y. For the year ending SeptemState Commisson in Lunacy. Albany, N. Y. 1897. Pp. 190.

House Plants and How to Succeed with Them. By Lizzie Page Hill-
house. New York: A. T. De la Mure Printing and Publishing Company.
Pp. 220. Price $\$ 1$.
For dwellers in cities, and especially those who live
in flats or apartments, this little book affords a in flats or apartments, this little book affords a goor deal of practical information which will enable the house-
keeper to raise and care for many beautiful plants, and keeper to raise and care for many beautiful plans, and
give one, even in such limited space, some of the deis fally illustrated.
European Architecture : A HistoriCAL STUDY. By Russell Sturgis.
New York: The Macmillan Company. Pp. 578. Price \$4.
Of books on architecture there are many, but of treatises which a reader of good intelligence, not himself an architect, can consult with profit and satisfaction. there are comparatively few, and of these we know of
no one so comprehensive, so free from prejudice and narrow ideas, and which discloses such ample knowledge and sound judgment, as this volume of Mr. Sturgis. Historians as careful and learned as Mr. Freeman exearliest ctrosely into all distinguishable details of the into the roots of words in of them prehistoric, as they do to throw light upon those far- back times in which were planted all over Europe, and particularly in all regions
near the Mediterranean, the evidences of races antecedent near the Mediterranean, the evidences of races antecedent
to, but powerfully affecting, those which came later upon o, but powerfully affecting, those which came later upon the stage, of whom we have more or less complete au-
thentic data. But it is not every author who has the as theations to correctly read the ancient landmarks, as then mark the history of the races of the earth; and when the architect seeks to piece them into studies of
the origin of different orders of architecture, and thence trace out their later development. one does not have far to go, in most cases, before feeling that he has left the of doabt and conjecture. In this work of Mr. Sturgis, however, the prefatory pages on archaic and prehistoric bailding, and the succeeding chapters on Grecian and Roman architectare, show us, as a connected whole, and more clearly than we have elsewhere seen it set forth, how it is that "somewhere in Grecian lands, about
coven handred year before our era, a beginning of as
hitecture was made; two centuries and a half later this had grown into the architecture which we admire; from was, and from Roman building has come all that of later Europe." The history of architecture in Europe from 50 A.D. up to recent times is covered by nine chapter in which is crowded a vast deal of valuable information nd most interesting comment. The bouk is embellishe in ten plates and aroter
A Treatise on Arches. By Malverd A. Howe, C. E. New York: John
Wiley \& Sons. Pp. 371 . Price 44. This is a book particularly designed to facilitate the
work of the practicing engineer, saving his time in the work of the practicing engineer, saving his time in the
making of many essential mathematical demonstrations, making of many essential mathematical demonsiratione,
and furnishing formule and tables adapted to his wante for a wide variety of work. The author is professorof vil engineering in Rose Polytecinnic Institute, and the readily followed by senior students in technical schools The large and valuable catalogue of Charles H. Besly \& Company, of Chicago, presents an extent and variety of tools and supplies which one sel dom finds in a single volume. It compris 38300 closel printed pages in fine type, with profuse illustrations an mple index, the articles catalogued including almo verything from an engine lathe to calipers or from differential pulley to a ecratch awl.

## SCIENTIFIC AMERICAN <br> BUILDING EDITION

## JULY, 1897.-(No. 141.

No. 1. Perspective elevation, in colors, and floor plans of Colonial residence at Overbrook, Pa .
unique design. Mr. Thomas P. Lonsdale, a chitect, Philadelphia, Pa .
No. 2. Colonial house at Richmond Hill, N. Y, recently nd floor plans. An attractive and pleasing de ign. Architects, Messrs. Haugaard Brother Richmond Hill, N. Y
No. 3. ta cost of $\$ 7,700$ complete. Wwo Murray elevatons and floor plans. A pleasing design, with excellent interior arrangement. Mr. Frank A. Moore, architect, New York City.

No. 4. A cottage at Prohibition Park, Staten Island, cently erected for Mr. August Mayer at a cost 2,250 complete. modern cotlage a swall amensions. Per Tinans, architect, Prohibition Park, State Island.
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excellent design in the Colonial style. Two erspective elevations and floor plans. M
A modern dwelling at Binghamton, N. Y. ently erected for Mr. William Mannis at a cost urban house. Two perspective elevations and fioor plans. Messrs. T. Q.
Binghamton, N. Y., architecte,
No. 7. A Colonial residence at Ardmore, Pa , recently erected for Dr. Louls O. Lusson. Perspective Boyd, architecte, Philadelphia, Pa.
No. 8. A Colonial residence at Bensonhurst, Long Island recently erected for Mr. Thomas A. Ritson Two perspective elevations and floor plans.
A handsome design. Architecte, Messrs. Parfitt Brothers, Brooklyn, N. Y.
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features. Mr. Edward S . Paxson, architect, Philadelphia.
No. 10. A residence at Attleboro, Mass., erected for E P. Clafn, Eeq, at a coat of 85,500 complete. An artistic and pleasing design. Messrs. George F. Barber \& Company, archiceta, Knoxville

No. 11. Perspective and interior view of the Walhalla of tion of the Parthenon at Athens. This temple was erected at a cost of about $\$ 6.000,000$, and is devoted entirely to the display of buste of distinguished Germans.
No. 12. Design for a "cozy corne
Mr. Henry L. Hotchkise ew Haven, Conn.
No. 14. Miscellaneous Contente : Fatalities to workmen -Scaffolding.-Lime water in freezing weather. -How to make a cheap greenhouse.-Making Improved door hanger, illustrated.-A novel wood work ing machine, illustrated. - Gray bricks. Dixon's silica graphite paint.-A convenien
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| :---: |

(7179) W. D. M. says: Is shellare con idered a good bicycle wood rim cement 9 If so, how is it prepared for that purpose ? Also, how should it be ap
plied P A. Cemente for Tires.
Shellac.....
Gutta perch
Red lead....
Red lead.

2 oz.
2 av.
a

Melt the shellac and gntta percha, and add, with constant stirr
while hot.

3. Caoutchouc........................ 2 oz.
Resin..................................... 140 gr ". Carbon disulphide, a suffcient quantity to dissolve 4. Crude rubber.
4. Crude rubber...
Carbon disulphide

Macerate twenty-four hours, and then add a solution
${ }^{\text {Resin. }}$
Beeswax. ........
Carbon disulphide
$1 \mathrm{oz}$.
$1 / 4 "$.
4
(7180) G. R. S. says : Will you kindly inform me through your Notes and Queries of a cleaner and polish for tan shoes that will not injure the leather ?
A. We have published directions for making preparations for cleaning and polishing shoes, in our Supriz MENT, Nos. 1063, 10 ris, 1078, ten cente eaci
(7181) J. C. McK. writes : I have been constructing an induction coil along the following lines and would be pleased to have your opinion as to the of coil inside heads will be a little over 13 inches. Three sections of 4 inche9 each. Size of coil when finished, 7 inches. Size of core, $18 / 8$ inch. Wire on primary, No. 16, two layers. Wire on secondary, No. 38, 100 layers approximately. Winding, 116 to inch. No. 200 thread (cot ton) between, making it a solid mass. Amount of wire on secondary, 5 pounds. Insulation between layers is two thicknesses of finely paraffined paper. The winding is very nearly perfect. We have one pound of wire on
now, and a 10,000 ohm magnet, will not ring through it, although some current passes. As No. 38 wire has a re sistance of a little over 10,000 ohms to the pound, the insulating must be very near perfect. We get quite a good shock by using a 10 volt battery, but it would seem to us that we ought to get more from No. 1 wire. We have no core, and no condenser, simply trying the coil in the winding apparatus. A. Your coil ehould give at the
longeat a 4 inch to $b$ inch spark from ite dimensions, though in a six inch coil as large a number of sections as eightareused in the secondary. The induced current say you would better have used iNo. 12 copper wire cot-
ton covered in two layers of primary, but additional cur-
rent can be used toovercome your larger resitance rent can be used toovercome your larger resiitance. In
doing so more heat will of course be developed, and the coil cannot be run as long at a time. With an odd number of sections in secondary, one end of the wire will come out on inside of spool. An even number of spools should have been used. The larger the number of sections, the less the risk of breaking down the insulation between the turns of secondary, becanse there is less dif-
(7182) R. E. R. writes : I have made the caustic potasin battery you describe in "Experimental Scince. I used a cast ror kule for the cell ather heat ing the water. I added the potash (39 pound), which wae in stick form, and after this was thoroughy ains is three eet long and six inches wide, rolled in spiral shape The inside of kettle seemed oo corrode to a considerble thickness. Can you account for it 9 Would no copper pail be a good substitute for the kettle ? A. The cell with oxide of copper in as iron dish, and a solution of caustic potash or soda, must have a thin layer of heavy petroleum oil on the top of the liquid to prepotash or soda. You do not mention using this. In the action of the cell a dark brown or nearly black mud is formed from the black oxide. This may be what you have thought to be the corrosion of the kettle. If the settle corrodes, it will be seen by the formation of holes or pits in the iron. Tbis should not take place. The zinc This is diffcult fith effect, shonda be amalgamated. This is diftcult with ordinary sheet zinc; probably im-
possible with so large a piece as you use. This battery is properly to be used on closed circnit ; that is, it hould be left with current flowing through a large resistance when yon are not at work with it. From your description it is difflcult to see why you have had a complete failure. The euggestions above may lead you to better success. A copper pail would be more expensive. If you would use copper, we wonld advise a dish set into a glass jar would form a good negative plate Rivet an insulated copper wire to the copper dish, so hat neither the liquid nor the zinc can touch'the wire on its way out. Tben, if you can !get a plate of zinc such as is used in the gravity lattery and amalgamate it, the result will be much better

## TO INVENTORS

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INDEX OF INVENTIONS For which Letters Patent of the United States were Granted JULY 20, 1897,
AND EACH BEARING THAT DATE LSeenoteat end of list about copies of these patents.]







