

(30) T. D. B. asks: 1. How to stain a sole leather bag somewhat abraded a dark mahogany color. A. Mix 15 grains alkanet root, 30 grains aloes, 30 grains dragon's blood, all in powder, with 500 grains alcohol (95 per cent). Moisten the bag with dilute nitric acid (1 acid to 5 water by volume) and then apply above solution. Repeat until dark enough. 2. I wish to calculate the power of a flow of water which flows in a broad, thin stream over a dam. A. Determine the "head" measured from level of main body of water above the dam to the level of the top of the dam, then multiply length of dam by 3.33, and multiply this by the square root of the cube of the head expressed in feet and decimals. The result will be in cubic feet. See Trautwine's "Engineer's Pocket Book," page 265. 3. What is the resistance approximately of carbon in sectional area such as is used in arc lamps and how to calculate the resistance at different temperatures? A. Carre's circular carbons 1 millimeter (0.04 inch) diameter have 50 ohms resistance per meter (39.37 inches). The resistance diminishes as the temperature increases. Between 0° and 100° C. the coefficient of reduction is 1-1912. This you can easily reduce to Fahrenheit's scale.

(31) T. A. R.—There is no way to bend wood better or cheaper than by steaming. Gun stocks, if bent at all, are steamed and bent in the rough. The trimmings are put on after the stock is finished.

(32) M. F. S. asks how to solve the following questions: No. 1. A clerk spends 20 per cent of 66 2/3 per cent more than 1/2 of his salary, and thereby saves \$533. What is his salary? No. 2. A cabinet maker directed his salesman to mark a set of furniture so that, by allowing 20 per cent on the marked price, he would realize a gain of 25 per cent. The salesman marked the set by mistake \$200, or at a loss to the dealer of 20 per cent of the sale. At how much less than the required marking price were the goods marked by mistake? A. Solve No. 1 by following equation: Let x = salary; then:

x - (3/4 x + 1/2 x) = 533
x = \$1,453.63.

Solve No. 2 by following equations: Let x = proper marking price, then y = cost.

(1) y = x - 1/5 x - 5
(2) y = 200 - 2/5 x - 200 - 2/5 x = 192

x = 300.

Or by analysis they may thus be solved: 1. He spends 1/2 of his salary plus 66 2/3 of his salary, and what is left amounts to \$533. Taking it by percentages, what he spends reduces to 50 per cent + 13.33 + per cent = 63.33 + per cent. Subtracting this from 100 gives 36.66 + per cent of his salary left unspent, which is equal to \$533. His full salary, therefore, is equal to 36.66 x 100 or 1,453.90 within limits of errors due to continued fractions. This is one solution, but the problem is worded so badly that several meanings may be drawn from it. 2. The suit marked at \$200 was sold at \$200 less 20 per cent, or \$160. This gave a loss of \$160 x 20 per cent or \$32. Thus the goods cost \$192. They were to be marked so that the selling price should give a profit of 25 per cent; \$192 x 25 per cent gives \$48. The selling price should have been, therefore, \$240. To this 25 per cent must be added for the marking price, or 240 x 25 per cent, giving \$60. The marking price should have been \$300.

(33) Benzine asks: 1. How can I color a solution of rubber in benzine, black and brown? A. Use asphalt or coal tar. 2. Does dragon's blood dissolve in benzine? A. Yes. 3. Would be glad to know through your valuable paper of a few colors that dissolve in benzine. A. Alkanet root extracts are peculiarly available for coloring benzine.

(34) L. M. R. writes: I have an incomplete Bunsen 6 by 8 inch battery, a zinc plate 2 1/2 in. wide being substituted for the zinc cylinder. Will you please inform me how much and what kind of acid I must use to complete the battery? A. For porous cup use following solution: Mix 1/2 part by weight of sulphuric acid with 3 parts water carefully and allow to cool. Dissolve six parts by weight bichromate of potash in 16 parts by weight of water by boiling, when cool mix two solutions and stir well. Use when cold. For glass jar use water.

(35) C. H. asks: How to transfer a printed illustration on paper to a glass magic lantern slide. A. Soak the print in soft water, varnish or float the glass plate with dammar varnish or Canada balsam. Allow to nearly dry; when still tacky carefully press the wet print upon it, and let all dry. Then with a wet finger you can rub off the paper, leaving the ink. A second coat of varnish will improve it.

(36) W. McP. asks: 1. Before a rain, the atmosphere contains moisture. The atmosphere and moisture weigh more than the atmosphere alone. Why then does the barometer not rise instead of falling? A. A falling barometer indicates the center of a storm disturbance, a rising one indicates its margin. These changes correspond with the rotary movements of the air, and not to the presence or absence of watery vapor in the air. 2. Can an electro-magnet be constructed in the form of a ring? If so, what parts correspond to the poles? A. It can be magnetized so that one end of a given diameter will be north and the other end south, or it may be magnetized so that it will exhibit no polarity until broken, when the ends will become magnetic poles. 3. Are street cars propelled by electricity a success? If so, why are they not more generally used? If not, where does the trouble lie? A. Yes; they are being rapidly introduced all over the country. 4. How fine a wire must be used in the secondary coil of an induction coil? A. No. 36. For induction coil construction we refer you to our SUPPLEMENT, No. 160, which we can send you for ten cents.

(37) J. C. K. asks the most economical and most effective point at which to set compound engines, where there is a coupling between them, to get best results. A. Set the cranks at right angles

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INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

November 13, 1888,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Acoustical instruments, mounting for diaphragms for, C. S. Tainter..... 392,763
Adding and subtracting machine, S. J. Webb..... 392,837
Advertisements, device for displaying, J. E. Woolverton..... 392,939
Air, apparatus for exhausting, J. W. Packard..... 392,686
Air brake, F. Lansberg..... 392,872
Air compressing device, J. S. Hunter..... 392,611
Alarm. See Burglar alarm. Fire alarm.
Amalgamator, plate, A. Gauthier..... 392,860
Animal trap, D. Henderson..... 392,674
Annunciator, F. Ritchie..... 392,970
Apron and support therefor, C. L. Jacoby..... 392,676
Automatic switch, M. Leary..... 392,678
Axle box, H. G. Bird..... 392,845
Axle box, car, W. O. Dunbar..... 392,593
Axle lubricator, W. Cole, Jr..... 392,906
Bag. See Paper bag.
Bag fastener, G. Leder..... 392,958
Baling press, C. L. & J. P. Ames..... 392,657
Baling press, P. I. Crews..... 392,785
Banana case, R. H. Aiken..... 392,705
Bar. See Sickle bar.
Basins, waste plug for wash, A. Moore..... 392,819
Batteries, automatic switch for secondary, J. S. Sellon..... 392,826
Battery. See Carbon battery.
Bearing ball, J. Jackson..... 392,956
Bed, S. R. Millen..... 392,743
Bed bottom, spring, F. C. Rheubottom..... 392,755
Bed, folding, A. S. Buttrey..... 392,585
Bed, folding, Etheridge & Flaspoeherl..... 392,913
Bed spring, J. Arn..... 392,708
Bedsteads for invalids, attachment for, G. G. Rambo..... 392,636
Belt fastening, A. Leforestier..... 392,873
Berth for sleeping cars, Beckley & Kimmey..... 392,842
Beveler, board, C. A. Lieb..... 392,616
Beverages, treating sparkling or effervescent, F. A. Reihlen..... 392,883
Bicycle, W. E. Smith..... 392,973
Bicycle, C. W. Sponsel..... 392,589
Bicycle saddle, A. H. Overman..... 392,821
Bin. See Flour and meal bin.
Bitters, C. E. & E. Bizozero..... 392,776
Block. See Brake block.
Board. See Wash board.
Boats, rolling seat for, E. J. Kerns..... 392,867
Boiler. See Sectional boiler.
Book, G. D. Barnard..... 392,840
Bookbinding, Wood & McMillan..... 392,938
Boot or shoe fastening, C. W. King..... 392,677
Boring machine, H. Longwell..... 392,900
Bottles, safety device for druggists', A. Geyer..... 392,861
Box. See Axle box. Cracker box. Fire alarm box. Spindle box.
Brake. See Air brake. Car brake. Carriage brake.
Brake block, P. P. Rickenbacher..... 392,884
Brick machines, cut-off table for, J. Fergusson..... 392,952
Broom clasp, M. C. Eichhorn..... 392,791
Buckle, A. J. McCoord..... 392,962
Buffing machine, E. B. Allen..... 392,707
Buggy body, N. Kastler..... 392,808
Building blocks, tiles, bricks, etc., composition for the manufacture of, G. S. Lee..... 392,615
Burglar alarm, L. K. Johnson..... 392,805
Burner. See Oil burner.
Burnishing machine, C. J. Blakely..... 392,944
Button fastening machine, A. Schillmoller..... 392,761
Buttonhole cutter, L. A. Carson..... 392,717
Button setting machine, Temple & Bolton..... 392,647
Can ending machine, J. H. Clapp..... 392,553
Cant hook, M. N. Rankins..... 392,752
Canting logs and operating sawmill dogs, device for, E. Beard..... 392,841
Car brake, J. A. Marchbank..... 392,740
Car brake, J. Mutton..... 392,745
Car brake, Shotton & Barnes..... 392,829
Car coupling, J. H. Davis..... 392,787
Car coupling, A. J. Elliott..... 392,596
Car coupling, A. R. Heath..... 392,801
Car coupling, Pickard & Melson..... 392,968
Car heating apparatus, J. H. Sewall..... 392,828
Car seat, street, G. A. Metcalf..... 392,876
Car stop, W. Walker..... 392,767
Cars, hay rack for stock, E. A. Stare et al..... 392,644
Carbon battery, J. B. Wallace..... 392,836
Carriage, J. T. Clarkson..... 392,854
Carriage brake, J. B. Crosby..... 392,910
Carriage curtain fastener, A. R. Tully..... 392,703
Carrier. See Egg carrier.
Cart, road, M. Copenhaver..... 392,900
Cart, road, E. C. McGrath..... 392,632
Cartriage, Johnson & Borland..... 392,922
Cartridge loading machine, G. M. Peters (r)..... 10,966
Case. See Bajana case. Show case.
Casting and finishing machine, type, Barth & Lietze..... 392,710
Centrifugal machine, O. Braunn..... 392,583
Christmas trees or other articles, support for, R. Langenbach..... 392,871
Chuck, lathe, F. C. Hinman..... 392,908
Chuck, cream testing, B. Kanable..... 392,865
Clamp. See Rail clamp.
Clasp. See Broom clasp.
Cloth steaming and drying machine, F. Brelle..... 392,903
Clutch and brake for baling presses, friction, C. E. & H. I. Whitman..... 392,898
Clutch, friction, R. E. Boschert..... 392,848
Clutch mechanism, J. & J. R. Bowers..... 392,714

Coal dust, utilizing, C. Kimplen..... 392,886
Coal washer, S. Stutz..... 392,974
Cogwheel keys, fastener for, B. Schardt..... 392,972
Collars, cuffs, etc., manufacturing, J. R. France..... 392,794
Coloring matter obtained from paraphenylen-diamine, etc., blue, E. Elsaesser..... 392,723
Copies of writings, drawings, and the like, apparatus for reproducing, G. H. Block..... 392,777
Corn fender, F. Pontius..... 392,824
Cornet fastener, L. Sacanville..... 392,639
Coupling. See Car coupling. Harness coupling. Wagon coupling.
Cracker box, L. J. Anger..... 392,942
Crusher. See Ore crusher.
Cultivator, wheel, J. F. Hall..... 392,728
Cultivators, sweep for corn and cotton, E. Cowan..... 392,590
Cut-off and pressure regulator, combined, A. Frank..... 392,602
Cut-off for water pipes, automatic, G. P. Herndon..... 392,803
Cutter. See Buttonhole cutter. Feed cutter. Paper cutter.
Desk, advertising or order, H. M. Dexter..... 392,556
Desk and seat, automatic school, J. H. Stiggleman..... 392,892
Die. See Leather cutting die.
Door check, Purviance & Hills..... 392,888
Door check, pneumatic, J. Muser..... 392,927
Doors, apparatus for opening, G. H. Maetzel..... 392,620
Doubletree equalizer, J. A. Haas..... 392,862
Dredging machine, J. G. Falcon..... 392,858
Dress shields, former for seamless, F. W. Smith, Jr..... 392,642
Drill. See Expansion drill.
Driving mechanism, frictional, J. M. Merrow..... 392,818
Dyeing, mordant for, C. T. Bazin..... 392,659
Dynamo, automatic governor for, E. B. Coburn..... 392,855
Egg carrier, J. Moran..... 392,628
Electric circuit, J. A. Barrett..... 392,775
Electric machine, dynamo, E. Thomson..... 392,765
Electric motors, regulation of, W. Stanley, Jr..... 392,890
Electric motors, synchronizing, F. J. Patten..... 392,980
Electric motors, synchronizing system for, F. J. Patten..... 392,967
Electrical circuit and apparatus guard, I. H. Farnham..... 392,724
Elevator, H. G. C. & L. A. Kreutzkamp..... 392,955
Elevator, C. H. Stilson..... 392,700
Elevators, speed governor for, Read, Jr., & Coyle..... 392,753
Embroidering machines, bead feeding attachment for, Strauss & West..... 392,833
End gate, H. O'Hare..... 392,965
Engine. See Rotary engine.
Envelope machine, G. R. Clarke..... 392,781
Envelope machine, S. A. Grant..... 392,916
Evaporating pan, D. Jones..... 392,864
Exhibitor for shirts, etc., Hardy & Baldwin..... 392,797
Expansion drill or cutter, S. W. Douglass..... 392,592
Fabric coating machine, H. G. Bunch..... 392,779
Fanning mill, H. G. Blom..... 392,713
Farm gate, O. F. A. Faulkner..... 392,599
Feed cutter, M. Klima..... 392,925
Felly iron, E. E. Renshaw..... 392,657
Fence, J. B. Cleaveland..... 392,948
Fence, D. Hyre..... 392,733
Fence, flood, E. B. Atkinson..... 392,709
Fence machine, picket, E. Smith..... 392,887
Fence machines, tension device for, D. E. Miller..... 392,684
Fence, portable, Smith & Shipley..... 392,830
Ferrule, F. Latulip..... 392,957
Fifth wheel, H. W. Ransom..... 392,825
File, paper, A. C. A. Perkes..... 392,750
Fire alarm and telephone telegraph, combined, G. C. Hale et al..... 392,604
Fire alarm box, auxiliary, E. L. Slocum..... 392,641
Fire extinguisher, T. G. Turner..... 392,936
Fire extinguisher and alarm, automatic, I. T. Dyer..... 392,951
Fire extinguisher, duplex percussion hand, E. A. Galbraith..... 392,671
Fishing fly book, C. G. Levison..... 392,959
Flour or meal bin, C. W. Fishel..... 392,793
Flywheel, Ramano & Barton..... 392,760
Flywheel clutching device, Ramano & Barton..... 392,759
Frame. See Harvester frame.
Fuel, prepared, C. Kimplen..... 392,869
Furnace. See Gas furnace. Straw or hay burning furnace.
Furnace, G. A. Clark..... 392,947
Furnace, S. S. Hersey..... 392,804
Fuse cap, W. H. Frazier..... 392,915
Garment supporter, E. Pickhardt..... 392,634
Gas, electric machine for lighting and extinguishing, G. E. Thaxter..... 392,701
Gas extinguishing apparatus, automatic, R. Howard..... 392,921
Gas from waste pipes or sinks, device for preventing the escape of, H. Stone..... 392,645
Gas furnace, regenerative, O. B. Weber..... 392,897
Gas lighter, electric, H. A. Cleverly..... 392,665
Gate. See End gate. Farm gate. Railway gate.
Gate, J. H. Bradford..... 392,778
Gate, H. C. Chivers..... 392,718
Gate, T. Tyson..... 392,887
Gate, W. R. White..... 392,655
Generator. See Steam generator.
Glass. See Opera, field, or marine glass.
Glass cleaning machine, A. F. Fitz Gerald..... 392,900
Glass ornamentation, E. & F. Smith..... 392,935
Glycerine from spent soap lyes, recovering, M. Highley..... 392,919
Gold and other metals, from sulphide ores or compounds containing the same, extracting, A. Parkes..... 392,929
Governor for pressure engines, J. Rothchild..... 392,688
Grain binder, automatic, E. G. Watrous..... 392,650
Grain drill, R. B. Sheldon..... 392,694, 392,695
Grain separators, oat extractor for, W. P. Clifford..... 392,783
Graphophone tablets, manufacturing, C. E. Hadley..... 392,796
Grate, fireplace, F. W. Merriam..... 392,817
Grinding mill, Gray & Birkholz..... 392,736
Ham, L. Anderson..... 392,839
Hammock, R. Gemmill..... 392,603
Harness, C. C. Cole..... 392,784
Harness attachment, J. S. Coolidge..... 392,908
Harness coupling, J. P. Maw..... 392,631
Harrow, E. E. Whipple..... 392,654
Harrow, rotary, W. A. & B. J. Smith..... 392,697
Harvester, M. Kane..... 392,807
Harvester, W. H. Payne..... 392,687
Harvester frame, grain binding, J. S. Davis..... 392,721
Harvester, self-binding, L. W. Noyes..... 392,747
Harvesters, sheaf carrier for self-binding, L. W. Noyes..... 392,746
Hat setting machine, Gordner & Curran..... 392,725
Hats, manufacture of felt, C. Vero..... 392,648
Hay sling, W. G. Ricker..... 392,690
Heel burnishing machine, J. H. Busell..... 392,715
Heel burnishing tool, J. H. Busell..... 392,716
Heel stiffening machine, E. H. Taylor..... 392,975

Heel trimming machine, A. McDowell..... 392,875
Hinge, spring, L. M. Devore..... 392,687
Hogs, portable apparatus for scalding, D. S. Amstutz..... 392,773
Hoisting device, G. L. McDaniel..... 392,621
Hoisting drums, bed plate and bearing for, E. McLane..... 392,815
Hoisting machine, A. & J. Robertson..... 392,758
Holder. See Order holder. Paper holder. Pillow sham and screen holder. Thill holder.
Hook. See Cant hook. Snap hook. Wire hook.
Hoop cutting machine, A. F. Ward..... 392,651
Hoop sawing machine, J. W. Blake..... 392,944
Horse detacher, W. A. Bryant..... 392,584
Horses, device for hitching, E. H. Turner..... 392,584
Horses, machine for grooming, Dellinger & McNaughton..... 392,788
Houses, construction of, J. S. Miller..... 392,625
I-beams, channel bars, etc., machine for cutting, C. M. Canahan..... 392,632
Incrustation, electrical apparatus for the prevention of, M. Kotyra..... 392,736
Indicator. See Station indicator.
Insulation of cores of dynamo-electric machines, B. Bidwell..... 392,630
Iron. See Felly iron.
Jack. See Wagon jack.
Knitting machines, thread feeding mechanism for, G. E. Nye..... 392,685
Knives and forks, apparatus for cleaning, F. Kleemann..... 392,870
Knob, sheet metal, A. T. Matthews..... 392,574
Knotter, F. A. Cloudman..... 392,719
Lacing hooks, machine for setting, S. N. Smith..... 392,831
Ladder rails, finishing, J. H. McCully..... 392,814
Lamp, J. F. Place..... 392,822, 392,823
Lamp, hanging, F. Rhind..... 392,699
Lamp socket, incandescent, T. Coad..... 392,666
Lamp switch, electric, C. G. Perkins..... 392,633
Leather cutting die, A. D. Goetz..... 392,673
Leg and foot protector, J. B. Brodie..... 392,584
Lock. See Nut lock.
Lock, L. K. Strang..... 392,646
Loom, hand, J. Fichtner..... 392,859
Lubricator. See Axle lubricator.
Lumber piler, P. O. Gustafson..... 392,727
Meat, packing cured, J. Cuning..... 392,949
Mechanical movement, J. W. Hoffman..... 392,610
Message and time recorder, J. C. Wilson..... 392,838
Metal wheel, T. S. Page..... 392,748, 392,749
Mill. See Fanning mill. Grinding mill.
Milling and gear cutting machines, cutting tool for, T. Eynon..... 392,597
Money, etc., safety packet for, T. E. McNamara..... 392,682
Motion, mechanism for transmitting, L. P. Clawson et al..... 392,782
Motor. See Water motor.
Mowing machine, W. Bayley..... 392,658
Nailing implement, H. McCornack..... 392,963
Nut for screw bolts, I. G. Howes..... 392,781
Nut lock, D. W. Throckmorton..... 392,702
Oil burner, hydrocarbon, W. C. Heister..... 392,802
Oil distributor for ships, etc., J. Ericson..... 392,712
Oil press, N. Littell..... 392,618
Opera, field, or marine glass, W. A. Cardwell..... 392,951
Order holder, J. F. Brown..... 392,945
Ordnance, mechanism for operating, G. W. Rendel..... 392,754
Ore crusher, J. M. Bryan..... 392,661
Outrigger, A. N. Barnes..... 392,501
Oven, M. R. Von Pittoni..... 392,649
Oxygen, composition for developing ozonized, J. E. P. Meyer..... 392,742
Packing, metallic wire, J. A. Prindle..... 392,831
Pan. See Evaporating pan.
Paper bag, F. M. McCulla..... 392,964
Paper cutter, L. Ehrlich..... 392,790, 392,857
Paper cutter, Tivy & Ehrlich..... 392,895
Paper holder and cutter, T. C. Eberhardt..... 392,668
Paving, composition of matter for, G. S. Lee..... 392,614
Peat machine, Yeardon & Middleton..... 392,770
Piano pedal, O. Lestina..... 392,737
Picking and carding machines, feeding mechanism for, Dickerson & Tindell..... 392,722
Pillow sham and screen holder, E. H. Rose..... 392,833
Pipe. See Smoking pipe.
Piston, P. Maltby..... 392,690
Planter attachment, corn, R. A. Dean..... 392,911
Planter, corn, J. A. Mussetter..... 392,828
Planter, cotton seed, W. Radley..... 392,689
Plaster mixing machine, G. West..... 392,652
Platform or step, F. H. Stanwood..... 392,891
Plow, C. A. Burch..... 392,780
Plow, wheel, H. N. Keith..... 392,613
Push fabric, two-faced embossed chenille, W. T. Smith..... 392,699
Poison distributor, J. Nelson..... 392,631
Post holes, boring, D. Hess..... 392,918
Pot cover, A. G. Stilson..... 392,762
Press. See Baling press. Oil press.
Press, R. E. Boschert..... 392,847
Press for butter or other plastic material, B. R. Rapp..... 392,882
Printer's drying rack, H. T. Koerner..... 392,735
Printing mediums or films, adjustable frame for holding, P. G. Caspian..... 392,586
Protector. See Leg or foot protector.
Puller. See Spike puller.
Pump and regulator, windmill, G. A. Carter..... 392,852
Rack. See Printer's drying rack.
Radiator, J. A. Prindle..... 392,932
Radiators, foot rest for, E. G. Coe..... 392,588
Raft, log, H. R. Robertson..... 392,691
Rail clamp, guide, W. P. Wylly..... 392,940, 392,941
Railway crossing signal, J. W. Harkom..... 392,798
Railway, electric, B. Heywood..... 392,864
Railway, electric, R. M. Hunter..... 392,675
Railway, electric, I. Robbins..... 392,771
Railway, electrical, O. Allen..... 392,772
Railway, elevated, R. T. Oney..... 392,682
Railway gate, automatic, W. S. Whiting..... 392,769
Railway switches and signals, interlocking device for, A. H. Johnson..... 392,734
Railways, conduit for electric, H. A. Chase..... 392,664
Railways, overhead conductor for electric, E. E. Ries..... 392,757
Railways, etc., permanent way for, Canby & Kinch..... 392,819
Rake and tedder, combined, A. Wickey..... 392,740
Recorder. See Message and time recorder.
Refrigerator building, J. F. Hanrahan..... 592,917
Reins, driving, M. S. Dickinson..... 392,789
Releasing device, C. P. & F. Wahlstrom..... 392,764
Riveting machine, G. D. Edmeston..... 392,694
Riveting machine, Plat & Delaloe..... 392,751
Roofs of barracks, means for elevating and supporting the, C. H. Thomas..... 392,764
Rotary engine, G. H. Weston..... 392,656
Ruler, J. H. Blake..... 392,846
Safety switch, C. L. Cooke..... 392,907
Salve, eye, J. R. Brown..... 392,904
Sash balance, Cronin & Moore..... 392,730
Saw sling machine, W. J. Lindsay..... 392,738