zinc of next, and so on, and an interrupted current to produce the statical effects required. See "Galvanic Batteries," in SUPPLEMENTS, Nos. 157, 158 and 159. Also "How to Make Induction Coils," SUPPLEMENT, No. 160. 2. How can a cracked lamp be mended so the oil will not leak through? A. Clean the glass thoroughly with strong hot solution of sal soda, warm, and apply over the parts inside and out the following: Resin, 3 parts; caustic soda, 1; water, 5; boil together until completely saponified, then mix with half its weight of plaster of Paris. 3. What kind of wax is it that engravers use to at the metals that are to be engraved upon by nitric acid? A. White wax, 2 oz.; black and Burgundy pitch, of each, ½ oz.; melt together; add by degrees powdered asphaltum, 2 oz., and boil until a drop taken out on a plate will, when cold, break by being bent double two or three times between the fingers. It must then be poured into warm water and made into small balls for use. 4. Is copper better for a boiler, 6 inches diameter and 12 inches long, than iron? A. Yes. 5. Is the pressure in the cylinder the same as in the boiler? A. No; it is always less, and how much less depends on the length and size of the steam pipes and the manner in which they are protected.

(18) I. K. E. asks: Can waterglass in small quantities be prepared for experiments without expensive apparatus? A. Fine quartz sand, 2 parts; carbonate of soda, 3½; reduce to fine powders, mix, and heat to a very bright red in a crucible capable of holding four times as much. As soon as the mixture is in a state of calm fusion pour out on an iron plate to cool. For use dissolve in hot water.

(19) H. G. E. asks: Cannot eggs, butter, etc., be kept for a considerable period by having them in a vacuum? Could a brick vault be cemented so as to be air tight, and capable of sustaining exterior atmospheric pressure? Would an air pump be the best way of exhausting the air? A. It is not practical; they would doubtless remain unchanged in a perfect vacuum, but that is unattainable by any ordinary means. Such a vault could be constructed; the pressure from without would be equal to about 15 lb. on each square inch.

(20) C. G. W. writes: I am led to believe that the cultivation of and gathering of such sumac as grows naturally in this sandy country would be a profitable industry. The stag horn sumac (*Rhus typhina*) grows here in abundance, other varieties to some extent. A. The best sumac of commerce is the leaves of the *Rhus coriaria*, cultivated in Sicily. It closely resembles the *R. typhina*, or stag's horn sumac, which has proved, when properly handled, to be nearly if not quite as valuable. See article on sumac, on page 199, vol. xxxvi., SCIENTIFIC AMERICAN.

(21) C. D. A. writes: 1. I have heard good engineers say that the friction of a valve depended entirely upon the size of the ports, and if there were no ports in the seat, a valve might be held against it, and when the steam was admitted, if the support was removed the valve would drop down; is this true? A. It would drop down. 2. I always supposed that the size of the valve determined the amount of friction. A. The friction depends upon the size of the valve, deducting so much of the ports as may have steam within, and the pressure upon the unbalanced surface of the valve.

(22) S. B. G. asks: Does a large wheel have any advantage in power over a small one in overcoming the friction on the axle, the axle and load being the same, and running on a smooth level surface? A. Yes.

(23) H. C. M. writes: I notice in vol. xliv., No. 24, page 378, of SCIENTIFIC AMERICAN, article 8, a formula for making oxygen gas for inhalation. Can you tell me whether it is the same as is used by physicians in Philadelphia? A. Probably. 2. Can water be surcharged with it, and if so, how? A. By passing the gas through cold water under pressure the quantity of oxygen it normally contains may be slightly increased. On exposure to the atmosphere or heat the oxygen thus taken up will soon escape again. 3. If not, how can it be used other than in the manner given in the paper referred to? A. We know of no other way of using it. There is no liquid solvent for oxygen that will take up enough of the gas to be of practical service in the way you propose.

(24) W. H. asks: 1. Of what kind of silk are balloons made? A. Good common undyed silk will answer. 2. What kind of oil are they prepared with? A. Usually a mixture of boiled oil and wax, thinned with turpentine. 3. How are the seams made air tight? A. The seams are "felled," waxed, and varnished inside and out. 4. Will gas keep its lifting power for one week, or longer? A. Yes, if kept in a perfectly air-tight vessel. In an oiled silk balloon envelope as usually constructed, no.

(25) J. B. B. writes: 1. A claims that a hollow shaft equal in diameter to a solid one has more strength in driving machinery than the solid shaft. B claims that the solid shaft, equal in diameter to the hollow one, is the strongest. Which is right? A. If of the same diameter, the solid shaft is the strongest; if of the same weight, the hollow shaft is the strongest. 2. What steam pressure is considered in getting the nominal horse power of a steam engine? A. The average pressure in the cylinder. 3. Is it not advisable to give a slide valve as small a stroke as possible, provided you get sufficient port opening? A. Yes.

(26) D. B. M. writes: I have a copper boiler, 36 inches long, 12 inches in diameter, ¼ in thickness, no flues. What would be the highest pressure to run with safety? A. Without knowing more of its construction we could not say. 2. Would a two horse power engine, with the above boiler, afford sufficient power to run one of Edison's generators to supply one of his lamps? A. Your boiler will not supply a two horse power engine, it is not equal to one horse power except it be driven very hard. 3. What would such a generator lamp, etc., probably cost? A. They are not in the market. You should write the inventor in regard to them.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

M. F. M.—No. 1. Tremolite—calcium-magnesium silicate. No. 2. Blue glass. No. 3. Calcium aluminum silicate. No. 4. The habitation of some insect—the material is chiefly lime carbonate. No. 5. Marcasite—FeS_2—with a coating of iron oxide. No. 6. Magnetite and hematite. No. 7. Argentiferous (silver bearing) galena. No. 8. Chiefly lead oxide. No. 9. Iron, alumina, and silica, with possibly a trace of silver.—E. S. B.—The gravel contains no precious metals—only mica and pyrites.

COMMUNICATIONS RECEIVED.

On a Mysterious Boiler Explosion. By W. A. D.
On Ripening Melons Underground. By I. T. B.
On the Wax Myrtles. By J. P. S.
How to Mount very Small Lenses. By C. S. M.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

February 8, 1881,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for one dollar. In ordering please state the number and date of the patent desired and remit to Munn & Co., 37 Park Row, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

Air compressor, J. F. Allen 237,359, 237,360
Air medicating apparatus, A. Bell 237,468
Amber, making articles from waste, A. R. Davis. 237,497
Ammunition packing box, E. G. Parkhurst. 237,406
Animal trap wheel, E. B. Ripley 237,601
Axles, machine for machining, F. D. Bliss 237,364
Barb holding device, T. W. Eaton 237,375
Basin attachment, wash, G. F. Schaffer 237,609
Bath tub, folding, G. Damen 237,494
Bed bottom, I. L. Landis 237,552
Belt lock or fastener, A. Loehner 237,399
Billiard cues, fastening tips upon, G. Zittel 237,656
Boot and shoe, O. E. Lewis 237,396
Boot and shoe, S. Newcomb 237,581
Boot and shoe heel, Stevens & Chisholm 237,626
Boot and shoe heel, M. Wise 237,651
Boot and shoe soles, frictional attachment for, G. W. Hewitt 237,529
Boot and shoe upper, H. G. Thompson 237,638
Bolt, C. Zube 237,657
Bolts and nuts, machine for threading, H. B. Burin 237,479
Brick machine, W. E. Tallcot 237,636
Bridge, arch, S. Bissell 237,471
Brush bridle, H. D. Musselman 237,579
Brush, stencil, T. T. Lotherington 237,562
Buckle, W. D. Ewart 237,506
Buffing wheel, A. Leavett 237,395
Building, fireproof, J. Gilbert 237,382
Bull wheel for artesian wells, M. B. McManus (r). 9,559
Buoy, signal, F. Barr 237,361
Button, separable, G. Van der Burgh 237,644
Calendering machine, cloth, R. J. Walker 237,421
Can stopper, W. H. Rodden 237,446
Canal boat, A. Albertson 237,462
Car coupling, J. C. Mathews 237,568
Car coupling, W. V. Perry 237,588
Car coupling, E. Weidling 237,648
Car door, grain, T. Butterworth 237,482
Car heater and ventilator, G. Laube 237,555
Car wheel, J. J. Davis 237,370
Car wheel, P. H. Lindsey 237,398
Cars, atmospheric compressor for street, I. P. Wendell 237,424
Carpet lining, C. H. Bradley 237,474
Carriage, W. Ruby 237,411
Carriage spring, H. B. Osborn 237,443
Carriage top, shifting, J. H. Fairbanks 237,507
Cartridge crimping machine, H. S. Burns 237,480
Carving fork, Haddan & Smith 237,521
Casting car wheels, French & Robertson 237,511
Casting metals, mould for, C. Sneider 237,634
Casting mould boards, mould for, G. K. Smith 237,619
Cement and lime, manufacture of hydraulic, Dimelow & Peadro 237,500
Cement, bituminous, E. J. De Smedt 237,662
Centrifugal machine, G. A. Hagemann 237,523
Chain, detachable drive, J. L. Pope ..... 237,591 to 237,593
Chain, drive, J. C. Coonley 237,489, 237,490
Chain, drive, J. M. Dodge 237,499
Chair seat and back, G. Hunzinger 237,535
Chest lock, G. B. Cowles 237,492
Chuck, lathe, J. B. Secor 237,614
Churn, Bartlett & Burd 237,658
Churn, S. B. Rathbun 237,598
Cigar bundling machine, J. J. Kruse 237,391
Cigars, machine for coloring and flavoring, E. Hadra 237,522
Clevis, A. Sanford 237,447
Clock striking mechanism, A. E. Hotchkiss 237,532
Clothes drier, revolving, T. Pritchard 237,407
Clutch and brake, friction, D. H. Merritt 237,570
Collar pad, harness, J. L. Richards 237,445
Copy holder, E. P. Newman 237,582
Corset, S. A. Drewry 237,503
Corset, E. L. Smith 237,618
Cotton chopper, R. I. Draughon 237,502
Cotton gin, J. Du Bois 237,433
Coupling for earth augers and rock drills, J. H. Sutfin 237,629
Cradle, grain, M. Naumier 237,580
Crimping machine, S. A. Gould 237,515
Cultivator, J. G. Evans 237,376
Cutter head for wood-working machines, S. A. Woods 237,652
Doll, celluloid, Lefferts & Carpenter 237,559
Door fastening, L. C. Northrop 237,583
Draught equalizer, A. C. & J. T. Jacobson 237,538
Draw gauge, E. G. Latta 237,554
Earthenware vessel, R. B. Eason 237,505
Electric machine, dynamo, W. E. Sawyer 237,632
Electric push button, illuminated, E. J. Swan 237,455
Electric signal, H. R. Miller 237,575, 237,576
Elevator, J. M. Dodge 237,501
Envelope and letter sheet, combined, J. F. Dodd. 237,374
Evaporating pan, T. E. Scantlin 237,448
Evaporator, Whitney & Simpson 237,649
Fan, L. Sanders 237,406
Fan, S. Scheuer 237,611
Fanning mill, H. Keller 237,438
Farm gate, A. Miller 237,572
Feeding and watering stock in cars, device for, A. D. Tingley 237,641
Feeding rack, W. T. Finch 237,535
Fence, D. S. Buck 237,367
Fence post, H. Laird 237,393
Fence stretcher, wire, Salisbury & Stevens 237,412
Fermenting vat, F. Fehr 237,509
Fermenting vat cooler, Kastner & Kunz 237,545
Fiber, machine for separating vegetable, E. A. Leigh 237,394
Fibrous stalks, machine for decorticating, A. Angell 237,463
Filter, J. Bergeman 237,469
Filter press, W. H. Harris 237,525
Firearm, breech-loading, W. H. Davenport 237,432
Fire escape ladder, O. Sherwood, Jr 237,616
Fire extinguishing sprinkler, automatic, A. M. Granger 237,517
Fish hook, E. Marion 237,566
Floors and ceilings, construction of, G. Howard 237,533
Forks, machine for cleaning and polishing, E. Hutchison 237,536
Fruit drying apparatus, C. H. Hill 237,530
Furniture, reversible center plate for, T. F. Darcy 237,495
Furniture spring, M. H. Learnard 237,557
Game board, C. E. Garrett 237,436
Gas generator, hydrocarbon, J. Flannery 237,663
Gas, process of and apparatus for manufacturing, J. J. Johnston 237,541
Gas scrubber, E. Joues 237,542
Glass articles, manufacture of, Dean & Peltier 237,371
Glass tile, mosaic, etc., L. C. Tiffany 237,416
Gleaner and binder, combined, H. N. Johnston 237,540
Globes, mounting and attachment for terrestrial, E. E. Fitz (r) 9,557
Governor, E. Wright 237,655
Grain drill gearing, J. King 237,390
Grain separator, W. Ackerman 237,460
Grain separator, A. S. Phelps, Jr. 237,589
Grain separator, I. Sherck 237,453
Grinding mill, G. & A. Raymond 237,599
Grinding wheels, machinery for automatically delivering sand to, H. C. Luther 237,563
Gun, rocket, N. E. Rice 237,444
Hame fastener, L. E. Jones 237,665
Handles for cutlery from vulcanized fiber, manufacture of, J. B. H. Leonard 237,440
Harness, breeching lifter for, S. F. Smith 237,414
Harness fastening, J. S. Maddox 237,565
Harrow, T. Rogers (r) 9,561
Harvester, H. N. Johnston 237,539
Harvester guard finger, W. Scott 237,613
Hatter's iron, F. C. Taylor 237,637
Hay rake, horse, J. La Dow 237,553
Heel breasting machine, A. K. Washburn 237,646
Hides for tanning, preparing, J. S. Swan 237,630
Hinge, gate, N. B. Sebring 237,451
Hinge, spring, F. W. Brocksieper 237,476
Hoisting and conveying machine, L. Messier 237,571
Hoop nailing machine, E. Cole 237,369
Horse bonnet, E. Boersch 237,473
Horse holding attachment for vehicles, R. E. Shannon 237,615
Hose nozzle, Johnson & Hoyer 237,386
Hot water apparatus, T. Fairbanks 237,508
Hubs, point band for, W. Neracher 237,441
Hydrant, J. Jonson 237,544
Hydrocarbons, device for burning liquid, L. E. & G. W. Dudley 237,504
Ice cutter, J. T. Martin 237,567
Ice making machinery, De La Vergne & Mixer 237,372
Indices, machine for cutting, W. E. Waters 237,647
Insect killer, E. S. Griffith 237,520
Kettle, preserving, J. I. Burr (r) 9,552
King bolts, manufacturing clip, Knowles & Hitchcock 237,550
Knitting machine, C. E. Kelley 237,546
Lamp, fountain, C. Stockmann 237,627
Lamp, street, E. Boesch (r) 9,556
Lamp switch, electric, W. Sawyer 237,608
Lathe, P. B. Conklin 237,487
Lathe tool support, E. Wright 237,654
Lead and crayon holder, C. W. Boman 237,365
Lead and crayon holder, J. Hoffman 237,384, 237,531
Leg and foot protector, W. Beattie 237,667
Life raft, H. Miller 237,574
Loom, L. J. Knowles 237,549
Loom, G. L. Pallatt 237,585
Lubricant, H. Hurty 237,437
Lubricator, H. Howe 237,534
Matches, apparatus for sulphurizing or paraffining friction, N. Butler 237,368
Mattress frame or bed bottom, F. A. Palmer 237,586
Meters, connection to, A. Mackey 237,564
Middlings purifiers, sieve for, J. A. Raney 237,597
Milk cooler, A. McCallum 237,403
Milk cooler, G. C. Shaler 237,452
Mitering machine, J. M. Rhodes 237,409
Mitten, Haight & Strossman 237,524
Moulding metals, flask for, C. Sneider 237,635
Mouldings, process of and apparatus for ornamenting, C. C. Stuart 237,628
Nailing machine, J. H. Foster 237,380
Net for horses, fly, J. F. Smith 237,622
Nut lock, E. J. Brooks 237,659
Oatmeal machine, G. H. Cormack (r) 9,558
Oil cup, S. G. Cabell 237,660
Oil cup for saws, F. Rousseau 237,604
Organ bellows, Fogelberg & Graves 237,378
Oven, baking, Aff & Jordans 237,461
Packing case, H. E. Clinton 237,486
Packing for steam and other joints, J. Kirkman 237,548
Packing, metallic piston, J. H. Brown 237,477
Pail, dinner, Ludlum & Peck 237,401
Pantaloons protector, B. C. Wilson 237,427
Paper box, Adams & Miller 237,358
Paper cartridge machine, G. P. Salisbury 237,605
Paper floor covering, D. H. Morrison 237,578
Paper weight and calendar, combined, G. A. Ogle 237,584
Pegging jack and bench, T. B. Ellis 237,434
Pen, fountain, W. W. Stewart 237,454
Photographic head rest, W. S. Laighton 237,392
Photographic negatives, producing impressions in line or stipple from, F. E. Ives 237,664
Pianofortes, stringing, A. K. Hebard 237,528
Piano lock, G. B. Cowles 237,491
Planter, corn, J. C. Van Dyke 237,420
Planters, fertilizer attachment for seed, H. Wright 237,428
Plow, Swenson, Lindquist, & Hedlund 237,631
Potato digger, L. V. Rouse 237,410
Preserving fruit juices, Schaumberg & Dillman 237,449
Press, C. L. Ingalls 237,537
Pressure regulating valve, R. H. Soule 237,624
Printing, apparatus for and method of chromatic, G. Schwarzwald 237,612
Printing machine, plate, H. Lee 237,558
Printing machine sheet delivery apparatus, W. Scott 237,413
Pulp, dry ground, H. B. Meech 237,569
Pump bucket and valve, S. A. Saum 237,607
Pump piston, W. Burlingham 237,450
Punch, metal, S. H. Jenkins 237,439
Puzzle, geometrical, E. Anthony 237,464
Radiator, indirect, T. H. Brooks 237,429
Railway, elevated, M. E. Walton 237,422
Railway switches, operating, R. P. Garsed 237,381
Railway track drilling machine, A. Loehner 237,400
Railway tracks, apparatus for laying, N. Kimball. 237,388
Railway train marker, C. W. White 237,459
Razor, J. Deasey 237,498
Reclining folding chair, F. Hunger 237,385
Rein holder, G. W. Miller 237,573
Safes and vaults, electrical envelope for, H. C. Roome 237,603
Safety pins, manufacture of, J. P. Courtney 237,661
Salt, manufacture of, N. B. Rice 237,600
Saw, circular, G. F. Simonds *et al.* 237,617
Saw jointer, circular, A. S. Pierson 237,590
Saw mill log carriages, brake for, F. Tuxworth 237,457
Sawing and routing machine, S. M. Bragg 237,475
Scarf ring, F. A. Sundberg 237,415
Scoop, S. H. Kerfoot 237,387
Sewer and stench trap, C. Halstead 237,383
Sewing machine, G. F. Newell 237,442
Sewing machine feeding mechanism, G. F. Newell 237,666
Shed, cattle, M. Thorp 237,639
Sheet metal articles, dies for forming flat, A. Scherb 237,610
Shirt bosom, S. K. Devereux (r) 9,554
Shutter worker, J. C. Landes 237,551
Sifter, H. A. Trench 237,419
Soldering machine, can, W. A. Wicks 237,650
Stair rod fastener, M. L. Githens 237,514
Stamp, hand, H. P. Smith 237,620
Starching machine, R. Brenner 237,366
Station indicator, automatic railway, J. H. Whitelegge 237,425
Steam generator, D. Renshaw 237,408
Steam pipes, boilers, etc., covering for, W. M. Bitler 237,363
Steering apparatus, steam, J. W. Watson 237,423
Stench traps, mercury seal for, J. Bennor 237,362
Still, oil, M. Livingston 237,560
Stock clearance indicator, J. C. Uhler 237,643
Stone, wood, etc., wheel or tool for cutting, sawing, or grinding, H. Blackburn 237,472
Stove back, W. Schenck 237,450
Stove shelf, Hasselhoff & Mayne 237,526
Stoves, attachment for burning crude oil in, L. C. Snell 237,623
Straw cutter, W. Barrett 237,466
Straw cutter, S. Luther 237,402
Swing, R. S. B. Thornton 237,640
Syringe, vaginal, F. Wilhoft 237,426
Tablet, writing, G. L. Garrigues 237,513
Telegraph, chemical, C. A. Randall 237,595
Telephone, G. W. Foster 237,379
Telephone lines, switch board for, E. T. Frost 237,512
Telephone switch, H. R. Miller 237,577
Telephone, transmitting, E. A. Schoettel 237,633
Telephonic transmitter, C. A. Randall 237,596
Terret, head, H. A. Perkins 237,587
Thill coupling, A. French 237,510
Thrashing machine, peanut, J. P. K. Daughtrey . 237,496
Ticket, admission, F. H. Cyrenius 237,493
Ticket reel and receptacle, C. S. Locke 237,561
Tobacco, apparatus for sweating and coloring, C. F. & B. A. Meyer 237,405
Toy, optical, G. E. King 237,389
Toy wheel, J. M. Jones 237,543
Truck, stove, H. G. O. Burrows 237,481
Turn table, A. J. Delavigne 237,373
Type distributing machine, D. Reynolds (r) 9,560
Umbrella and parasol, Bissland & Williams 237,470
Umbrella and sun shade, H. B. Gray 237,518
Umbrella and water cooler stand, J. F. Conway 237,488
Valve, steam, G. J. Roberts 237,602
Vaseline, refining, R. A. Chesebrough 237,484
Vehicle spring, E. Spaulding 237,625
Vehicle spring, J. Tilton 237,456
Wagon bolsters, adjustable standard for, J. Grier 237,519
Wall paper manufacturer's use, hanging up and carrying off machine for, J. Waldron 237,645
Washing machine, R. G. Baldwin 237,465
Washing machine, B. R. Trull 237,642
Washing machine, J. E. Watkins 237,458
Washing machine, B. Wright 237,653
Watch key, stem winding, E. C. Fitch 237,377
Water cooler, T. W. McKeever 237,404
Water elevator, windmill, J. M. Hasting 237,527
Weather strip, J. E. Gowen 237,516
Wells, method of and apparatus for sinking oil and other, L. Smith 237,621
Wheat scouring apparatus, A. Buhl 237,478
Windlass, E. & G. N. Waterbury (r) 9,555
Windmill, H. H., C. H., & C. Beckman 237,467
Windmill, Chamberlain, Signor & Straw 237,483
Window, colored glass, L. C. Tiffany 237,417, 237,418
Wire springs, machine for forming, G. W. Lewthwaite 237,397
Wood, producing designs upon, S. K. Devereux (r) 9,553
Wood working clamp, A. M. Colt 237,431
Wrench, C. L. & H. F. Praeger 237,594
Wringer and bench, I. R. Laux 237,556
Wringing machine, J. Kinleyside 237,547

DESIGNS.

Carpet, J. Neil 12,162
Hair ornament, A. Progel 12,163
Oil cloth, C. T. & V. E. Meyer ..... 12,150 to 12,161
Steam engine, C. M. Farrar 12,149

TRADE MARKS.

Bitters, A. Dryfoos 8,157
Cigars, A. Estlow 8,158
Medicinal preparation, Orthozoic Chemical Association 8159
Oily compounds for coating surfaces as a paint or lubricant, J. Dixon Crucible Company 8,161
Paper of all kinds, writing, Z. Crane, Jr., & Brother. 8,156
Washing compounds, A. Zink 8,160

English Patents Issued to Americans.

From February 4 to February 8, 1881, inclusive.

Barrel hoops, machine for nailing, E. Cole, B'klyn, N. Y.
Buoy, signal, F. Barr, New York city.
Engine, hot air, A. S. Lyman, New York city.
Furnace for burning gas, A. L. Holley, Brooklyn, N. Y.
Hatter's irons, F. C. Taylor, New York city.
Ice, manufacture of, T. L. Rankin *et al.*, New York city.
Loom, F. O. Tucker, Hartford, Conn.
Moulding hollow articles, W. B. Carpenter, Newark, N. J.
Nailing machine, J. H. Foster, Chicago, Ill.
Necktie, Fisk, Clark & Flagg, New York city.
Pipe joint, W. Painter, Baltimore, Md.
Razor machinery, J. D. Frary, Bridgeport, Conn.
Separating solid from liquid matter, P. Cassamajor, Brooklyn, N. Y.
Steel, manufacture of, J. Conant, M.D., Prairie du Chien, Wis.
Steam boiler, D. Renshaw, Cohasset, Mass.
Transporting money, etc., J. C. White *et al.*, N. Y. city.

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