

THE RECOIL OF GUNS—ACTION AND REACTION NOT EQUAL.

BY PROFESSOR CHARLES A. SEELY.

In my days of gunning, long time ago, one of the mysteries among the boys was the recoil of our guns. We had theories and superstitions about it which are not worth repeating. But out of my experience I have brought a very distinct remembrance that the "kicking" was something that we were afraid of and that there was a great difference in the vicious propensities of our guns. It must be borne in mind that the shoulder of a boy is tender, and cannot easily bear a blow which a stout man might not notice. The kicking power seemed to us one of the most noteworthy properties of guns. There was a gun which was famous all over the county as a great kicker: it was said it could kick us into the "middle of next week," a distance we thought to be very considerable.

During the progress of the rebellion, when every one was a strategist and a critic on the art of war, I assisted in many discussions on the philosophy of the recoil of guns. I found that no one lacked experience or an opinion. But the opinions were generally incorrect, and those which were right were not fortified by good reasons. So I think a renewal of the discussion may be interesting and profitable.

The expansive force of burning gunpowder is the source and the only source of the movement of the shot and the gun. The force of the powder is expended upon and divided between the shot and the gun, and for my present purpose it may be considered that the force of the powder equals the force of the shot plus the force of the recoil. So far all are agreed: there is no difference of opinion. The debatable question is this: What is the relation of the force of the shot to the force of the recoil; are they equal, and if nay, why not? To put the case in its simplest terms: the shot and the gun are two unequal weights acted on at the same time and for the same length of time by an elastic substance pushing them apart.

People generally think that the powder force is equally divided between the shot and the gun, and that the relative weights of the shot and the gun are not to be taken into account. They found their opinion upon a supposed law of motion, that action and reaction are equal, and upon a supposition that the pressure upon the gun is the same as upon the shot. Now as to the law of motion, it is either misunderstood or it is absolutely unfounded. If action implies motion and force, a simultaneous and equal reaction to my mind is inconceivable. If there be a motion, any obstruction or reaction to it, as long as the motion continues, surely cannot be equal to the impelling force. If my neighbor push me down, his action is greater than my simultaneous reaction: I may get up and get even with him, but then there comes into the case a new action and reaction. It may be that all motions will finally cease by reason of reactions, but when the rest takes place, it is hardly proper to say that there is still action and reaction. Is not the alleged law of motion a very imperfect way of expressing a self-evident fact about rest or equilibrium? It certainly is not easy to see how the little truth it embodies has any application to the question of the recoil of guns. The fact is that people who quote this law generally misapply it.

The pressure on the shot and the gun may be considered as equal (if there is any difference it is greater on the gun), and the expansive force acts an equal time on each. But those who infer an equal division of the force, overlook a very essential element in their calculation. The shot moves faster than the gun and the force acts on the ball through a much greater space. Is not the space through which a force acts something to be as carefully considered as the time?

Take two balls of equal weight and place a spring between them which will impel them apart. In this case the force of the spring is conveyed to the balls and is equally divided between them: one moves as far and with as much force as the other. Now place one end of the spring against an immovable abutment, and allow it to expand against a single ball. Here the pressure on the ball and the abutment are equal, but the spring expands to its full length and gives its whole force to the ball: there is nothing lost on the abutment. The force imparted to the ball is precisely twice that which it received in the first experiment. Repeat the first experiment with balls of different weights. For example, let one have double the weight of the other. The force will now be divided so that the light ball will receive twice as much as the heavy. From such experiments the conclusion will soon be reached, that the force of the spring will be divided between the balls in a ratio inversely as their weights: if the weights of the balls be as 1 to 10, they will receive the force in the ratio 10 to 1. If a well-made spiral spring be employed, it may be observed in each experiment that there is a neutral point which does not move at all and that it is the center of gravity of the two combined balls. Thus when two balls of equal weights and sizes are used, it will be in the middle of the spring: in the second experiment it will be in contact with the abutment: in the case of the balls of weights 1 to 2, it will be two thirds the distance between the balls from the ball, 1. Thus this point indicates the division line between the amounts of force going to the balls respectively.

Such experiments may be varied by using a contracting instead of an expanding force. Take two toy wagons, connected by a rubber cord, and use weights of any convenient material. Or the weights may be suspended by cords, to be drawn together by the contraction of a rubber spring. The result will always be arrived at that the forces will be divided inversely as the weights. Moreover it should be observed that the velocities communicated to the balls are inversely as their weights. In the case of the balls 1:2, the corresponding velocities will be 2:1.

In these experiments we have a fair representation of the case of the gun: the spring is the expansive force of the powder, the large ball is the gun, and the small ball is the shot. Can the conclusion be doubted that the force of recoil is to the force of the shot as the weight of the shot is to the weight of the gun. If the weight of the gun be 100 lbs. and the shot 1 lb., then the force of the shot will be 100 times that of the gun.

Those who are well skilled in mechanics will reach the same conclusion by a shorter road. The formula  $MV^2$  expresses the value of the force of a body. The weight (M) of the shot and of the gun of course are known, and as soon as it is determined that the velocities of shot and gun are inversely as their weights, the problem is solved. Thus, let the weights be as 1 to 100, then the velocities will be as 100 to 1, and the expression for the force of the shot will be  $1 \times (100)^2 = 10,000$ , and the force of recoil  $100 \times (1)^2 = 100$ . But  $10,000 : 100 :: 100 : 1$ .

It is a plain result of the theory above given that the force of the recoil is directly proportioned to the amount of powder used. And in a given gun is proportioned to the weight of the shot, or if the shot be the same, to the weight of the gun. By doubling the weight of the shot the recoil is doubled.

If the prevailing notion about recoil were true, we should have a very different system of warfare, for the danger in battle would be to those who fired the guns. It involves, also, other absurd consequences, such as that in the steam engine half of the force of the steam is lost on the end of the cylinder, and that we can never utilize the whole of any force.

In conclusion, I am obliged to say that the guns and shot I have spoken of are model and theoretical guns, and that there are difficulties in the way of directly applying the theory to actual practice. The force of the powder does not show the whole of itself in the shot and in the recoil. A notable amount is lost in the concussion of the gun, windage, and in overcoming the friction of the shot. This last is a very important circumstance, as it holds back the shot, giving the gun a longer time than due to it to absorb the powder force. The ratio of recoil to shot will always be greater than by the simple formula I have given. The guns need more lubricators. And it will be seen that there is plenty of room for practical experiments; nothing to-day would more please me than to read reports of intelligent practical tests.

PROVING A GREAT GUN.—The second big gun (20 inch) cast at the Fort Pitt Foundry has been tested with charges of 60, 80, and 100 pounds of powder, and shot weighing 1,020 pounds. The trial was under the inspection of Commodore Taylor, of the United States Navy, now on inspection duty at the works, who was well satisfied with the trial and pronounced the gun thoroughly fitted for duty.



ISSUED FROM THE U. S. PATENT OFFICE FOR THE WEEK ENDING JAN. 22, 1867.

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PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

Table with 2 columns: Fee description and Amount. Includes items like 'On filing each caveat', 'On filing each application for a Patent', 'On issuing each original Patent', etc.

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & Co., Publishers of the SCIENTIFIC AMERICAN, New York.

61,304.—CABBAGE CUTTER.—Henry Aeter, Muscatine, Iowa.

First, I claim the manner substantially as herein described and shown of arranging a series of scroll knives on a rotary bed, and beneath a stationary hopper, so that two or more knives are made to cut at the same time, under the same hoppers, as shown.

Second, The arranging with a cabbage cutter bed, such as described, of the frame, A, B, with box, K, hinged legs, G, G, guard board, F, and bracket extension, substantially as described, and for the purposes set forth.

61,305.—MELODEON.—Charles Austin, Concord, N. H.

I claim as my invention the arrangement as well as the combination substantially as above specified, of a lever, E, and one or more additional reeds, I, and the operative apparatus thereof, as explained, with the exhaust chamber, D, and a main reed key, A or B, thereof, the same being so that on pressing down the said key for the purpose of opening the main reed valve thereof, the lever, E, shall be moved so as to put in operation each additional reed operative apparatus, whereby its reed or reeds may be sounded simultaneously with the main reed.

61,306.—FAN TOOL FOR CUTTING MOLDINGS.—Edwin C. Austin, Monroe Village, Wisconsin.

First, I claim the knives, C, constructed with the projections or bearings, c, pressing upon the surface of the wood in advance of the cutting edge, substantially as and for the purposes specified.

Second, The tool hereof described for cutting rope or screw molding, constructed and operating substantially as described.

61,307.—DOUGH MIXER AND ROLLER.—J. Bailie and J. Gervers, Cincinnati, Ohio.

First, We claim the combination of the rolls, D, D, with the worm or screw dough mixer, A, in the manner and for the purpose set forth.

Second, We claim the combination of the carrying band or belt, I, and snabbing rolls, D, D, with a worm or screw dough mixer, in the manner and for the purpose substantially as specified.

Third, We further claim the combination and arrangement of the spur and worm gear as shown for regulating the speed and giving a positive motion to the screw, A, snabbing rolls, D, D, and carrying band, I, for the purpose and in the manner substantially as described.

61,308.—BILLIARD CUSHION.—A. Bassford, New York City.

First, I claim in a billiard cushion the use of metal C ribbon or other hard and elastic strip interposed between two pieces of vulcanized india rubber of different degrees of elasticity, or within a rubber cushion substantially as herein set forth.

61,309.—APPARATUS FOR CARBURETING GAS AND AIR.—John F. Boynton, Syracuse, N. Y.

First, I claim in a carburating box or vessel a tube or tubes, whether flat, cylindrical, or of other form, filled with fibrous or capillary material, and so arranged with openings at the bottom that the carbonizing fluid will be constant subjected described.

Second, In a carburating box or vessel constructed and operating as herein described, I claim so arranging the capillary tubes that the gas in its passage through the vessel will move slowly in a thin stratum over the ends of the wicks containing the carbonizing fluid substantially as described.

Third, I also claim dividing the carburating vessel into two or more compartments, by soldering one of the plates forming each of the double partitions or wick tubes to the bottom and sides of the vessel, so that two or more different carbonizing fluids may be used in the same vessel, without mixing previous to evaporation.

61,310.—THRILL COUPLING.—John F. Bridget, Washington, D. C.

I claim the combination of the set screw, G, and socket plate, H, and spring, E, operating to raise the end of the thrill in its bearings, substantially as and for the purpose described.

61,311.—BASKET ATTACHMENT FOR PISONS OF DEEP WELL PUMPS.—Erasmus D. Brown, Buffalo, N. Y.

I claim the slotted flaring basket, A, for the purposes, and substantially as described.

61,312.—BOAT DETACHING TACKLE.—Samuel Brown (assignor to the Brown and Level Life Saving Tackle Company), New York City.

I claim a boat-connecting apparatus, composed of the ring, a, hook, c, and chains, b, g, and which is disconnected from the block by slacking the chain, g, in the boat to be launched, substantially in the manner and for the purpose described.

61,313.—MANUFACTURE OF BRANDY.—D. Jay Browne, Cambridge, Mass., and Steuben T. Bacon, Boston, Mass. Antedated Jan. 14, 1867.

First, We claim the blending of brandy or spirits distilled from sorghum syrup with brandy distilled from fermented grape juice, water and sorghum sirup, or glucose, substantially as herein set forth.

Second, In the production of brandy from the combination of the above-named materials, we also claim the mode of fermenting in close casks, or vats, furnished with tubes or coils within, for regulating the temperature of the liquids while fermenting, substantially as herein specified.

Third, In the production of brandy from the above-named ingredients, as necessary to secure success, we also claim the process of distilling in vacuo, substantially as and for the purposes herein described.

61,314.—PROCESS OF MAKING SUGAR.—Duncan Bruce, Rossville, N. Y. Antedated Jan. 17, 1867.

First, I claim the combination of the vacuum chamber and condensing chamber, with one or more evaporatory chambers, having steam or hot water heaters applied to them, substantially as described.

Second, The combination of one or more air-tight vessels with one or more air-tight evaporators and a condensing chamber, B, which communicates with a vacuum chamber, E, substantially as described.

61,315.—APPARATUS FOR DECOMPOSING ANIMAL AND VEGETABLE SUBSTANCES, FOR CURING MEAT, TANNING, ETC.—Duncan Bruce, Rossville, N. Y. Antedated Jan. 17, 1867.

First, I claim an apparatus consisting of a series of air-tight vessels communicating with a condensing vessel, and also with a vacuum reservoir, having a forcing and exhausting engine applied to it, the whole to be used substantially as described.

Second, Cu herein described.

Third, The process, substantially as described, of obtaining grease from fatty substances, by subjecting these substances to the action of moist heat in a vacuum.

61,316.—PRESERVING GREEN CORN.—S. John Carroll, Baltimore, Md.

I claim preserving green corn in the manner substantially as herein set forth and described.

I also claim the new article of manufacture and commerce, green corn preserved substantially as herein set forth and described.

61,317.—BUTTON.—Henry T. Carter, Portland, Me.

I claim a button provided with a slitted and pointed shank, c, in combination with the disk, d, and washer, b, substantially as described and for the purpose specified.

61,318.—MACHINE FOR PRESSING FUEL INTO BLOCKS OR BRICKS.—John B. Collen, Philadelphia, Pa.

I claim a machine constructed, arranged, and operated substantially as herein described and represented, for the purpose of pressing artificial or natural fuel in a fine or granular state into blocks or bricks for transportation and for burning, as set forth.

61,319.—PUMP.—H. Comstock, Seneca Falls, N. Y.

First, The combination of the rubber cup or flange, f, with the metallic leather packing, c, operating substantially in the manner and for the purpose specified.

Second, The groove, g, in the bottom of the cylinder, in combination with the valve yoke, C, operating substantially as and for the purpose set forth.

61,320.—DENTIFRICE.—John G. Cook, Lewiston, Me.

I claim as a dentifrice a chlorate compound, made up of ingredients, substantially as described.

61,321.—SAFETY PAPER.—L. M. Crane, Ballston, N. Y.

I claim, First, The inserting or incorporating of one or more threads or strips of gutta percha or fiber of paper du that said threads or strips will be softened and firmly united to the fiber under the heat of the drying cylinders, substantially as set forth.

Second, I also claim, as an improved article of manufacture, a safety record paper, made substantially as herein shown and described.

61,322.—MACHINE FOR PREPARING COTTON, ETC.—W. Crighton and F. W. Crighton, Manchester, Eng. Patented in England April 3d, 1861.

We claim, First, The arrangement hereinbefore described consisting of placing the beaters or openers on a vertical axis, and forming the place or opening for the delivery of the cotton at the top of said case, or at a point higher than that at which the cotton is fed into the machine, said machine being also constructed and its parts so arranged that a considerable portion of the dirt will be delivered either at the bottom of the beater case or cone, or through open rings at a lower point than that at which the prepared cotton is delivered, substantially as hereinbefore set forth.

Second, The combination with a beater case, and beaters, or other similar apparatus for cleaning cotton of the carrier or series of dirt boxes, d, substantially as hereinabove set forth.

61,323.—BLAST FOR IRON AND OTHER FURNACES.—Felix A. T. de Beauregard, Paris, France.

I claim surrounding the furnace by a tank the water within which is converted into steam by the heat of said furnace and then discharged through suitable pipes or conduits arranged substantially as herein described, so the discharge of the said steam shall induce a blast within and through the furnace, as set forth.

61,324.—STEAM GENERATOR.—Jules Delery, St. Bernard Parish, La.

I claim the isolating check valve, b, connecting rods, E and L, and lever, J, in combination with the generator, and water communication pipe, substantially in the manner shown and described.

61,325.—TELEGRAPHIC CABLE.—A. J. B. De Morat, Philadelphia, Pa.

I claim the construction of telegraphic cable by means of insulated tubes or continuous cylinders, formed of helically wound strips in such manner as to preserve uninterrupted linear conduction in case of stretching, as herein set forth, or any other substantially the same, and which will produce these intended effects.

61,326.—WHEAT DRILL.—Geo. W. Doolittle, Lincoln, Ill.

First, I claim the jointed frame, A, C, to which the compressing wheels, D, E, are attached, in combination with the funnels, L, L, depositing tubes, K, angular bars, I, I, cutter blades, H, H, substantially as arranged for the purpose set forth.

Second, I claim the arrangement of the standard, P, lever, m, capstan, n, for controlling the depth of the drills, K, or lifting them out of the earth in combination with the drills or delivery tubes, and the mechanism for regulating the quantity of seed, substantially as herein described for the purposes specified.

61,327.—WASHING MACHINE.—George H. Dow, Freeport, Ill.

I claim the arms, E, E', roller upper board, C', and pressure board, F, in combination with the concave washboard, H, lower roller board, C, and springs, D, arranged as and for the purpose set forth.

61,328.—BARREL BUNGS.—M. S. Drake, Newark, N. Y.

I claim, as a new article of manufacture, a bung for barrels, casks, or cases, constructed substantially as specified.

61,329.—TAIL BOARD FOR WAGONS.—Joseph O. Farrell, Chicago, Ill.

I claim providing the tail boards with a double latch, constructed substantially as described, that is to say, consisting of a rod and two rack bars rigidly connected and vibrating in journals in or on the tail board under the impulse of the hand, or of the spring, so that they shall in the braces, I, as the tail board is moved, and when the end of the spring shall afford support to the tail board by the engagement of the notches, substantially as described.

61,330.—SAFETY VALVE.—John H. Fitz Simmons, Susquehanna Depot, Penn.

I claim the combined valves, F and E, with valve seats, A and C, the steam pipes, G, G', together with the releasing screw, X, as herein described and for the purpose set forth.

61,331.—CHERRY STONER.—F. G. and E. A. Floyd, Ma-  
comb, Ill.  
First, We claim the knife or stone retainer, o, when constructed in the man-  
ner shown, and supported on the single arm to permit it to operate in connection  
with the reciprocating bar, c, substantially as herein set forth.  
Second, The reciprocating bar, c, having the plates, n, attached and pro-  
vided with the holes, e, when used in combination with the knives, o, sub-  
stantially as shown and described.  
Third, The hopper, B, reciprocating bar, c, knives, o, and bed piece, e, all  
arranged and operating as described.

61,332.—CLAMP FOR RAISING TIMBER FRAMES.—E. G. Ford  
and H. Weible, Delphos, Ohio, assignors to E. G. and  
J. G. Ford.  
We claim the hinged bars, C, D, constructed and arranged to operate sub-  
stantially as and for the purpose set forth.

61,333.—SHAKER ATTACHMENT FOR THRASHING MACHINES.—  
David Frost, Dupage, Ill.  
I claim the application of the slotted lapping plates, confined together by a  
thumb screw, to the pitman and vibrating knockers or shakers of a straw-  
carrier belt all in the manner and for the purpose described.

61,334.—MACHINE FOR RIVETING BUTTONS TO FABRICS.—W.  
J. Gordon, Philadelphia, Pa.  
I claim, first, The lever, H, in combination with the spindle, D, having a  
pointed projection, I, when the lever is provided with a beveled eccentric  
projection, w, or its equivalent, and when the spindle is so constructed and  
arranged, in combination with the lever, that on operating the latter, the spindle  
will turn around as it descends, for the purpose specified.  
Second, The combination of the above with the sleeve, E, having a projec-  
tion adapted to the cavity in the button, and with the springs, h and n, the  
whole being arranged for joint action, as and for the purpose described.  
Third, The concavity so formed in the base, A, in respect to the head of the  
rivet, and to the lever, that on operating the latter, the rivet will be forced  
into the said concavity, the edges of the said head will be turned up, as and  
for the purpose described.

61,335.—SUPPORT FOR WINDOW SASH.—Ellen M. Griswold,  
Hagerstown, Md.  
I claim the application to window frames of a sash support composed of the  
adjustable pieces, C C', connected by hinges, substantially as and for the  
purposes set forth.

61,336.—APPARATUS FOR DETACHING BOATS.—Increase S.  
Hill, Boston, Mass. and Andrew Burnham, Chelsea, Mass.  
We claim, first, The arrangement of curved disengaging rods in guides  
along the gunwale of a boat, substantially as herein described, when the  
same are connected with a pivoted lever through the operation of which the  
disengaging rods are simultaneously retracted liberating the links by which  
the boat is suspended.  
Second, A graduating coupling in the disengaging rods by means of which  
the lengths thereof may be so adjusted as to secure simultaneous disengage-  
ment of the suspending links, as and for the purpose described.

61,337.—CAN FOR PAINT, ETC.—William A. Hopkins, New  
York City.  
I claim the combination of the can, cover, ears and clamps when the same  
are combined, constructed, and operate substantially as shown for the purpose  
specified.

61,338.—WRITING PAPER.—J. E. Hover, Philadelphia, Pa.  
I claim as a new manufacture, writing paper, the surface of which is coated  
with chalk or other material which will neutralize the acids in writing inks  
or fluids.

61,339.—APPARATUS FOR OBTAINING AND APPLYING MOTIVE  
POWER.—William Huston (assignor to himself and H. N.  
Wickersham), Wilmington, Del. Antedated Jan. 19,  
1867.  
First, I claim the combination of the disk, F, and its chamber, X, and the  
disk, F', and its chamber, X', with the piston, G, the whole being arranged  
for joint action, substantially as and for the purpose herein set forth.  
Second, In combination with the above, I claim the heads, B and B', with  
the recesses and openings arranged substantially as described.  
Third, The combination of said disks, piston and heads with a casing, A.

61,340.—WRENCH.—Joel C. Jackson, Rochester, N. Y. An-  
tedated Jan. 17, 1867.  
I claim the peripheral recesses or groove, o, in the wrench barrel, c,  
formed with ratchet teeth in its bottom surface, in combination with the stop  
lever pawl, a, within the stock, b, as and for the purposes set forth.

61,341.—FILE CUTTING MACHINE.—A. F. Johnson, Boston,  
Mass., and M. P. Griffin, Medford, Mass.  
First, We claim the combination of a swiveling head with a rotary stock,  
substantially as described.  
Second, The combination of a chisel and adjuster with a rotary stock, in  
the manner substantially as described.  
Third, Placing the chisel and adjuster together in the same stock, when  
constructed and arranged as described.  
Fourth, The lever, D, in combination with the tool stock.  
Fifth, The adjustable screw jaws, T U, in combination with the ratchet, f,  
screw, S, and bed, B.  
Sixth, Inserting ratchet blocks at the ends and between the bows of the  
elliptic springs, I L, in a file-cutting machine, constructed substantially as de-  
scribed.

61,342.—CAST-IRON CHIMNEY.—David June, Fremont, Ohio.  
I claim the section, B, in two parts, C C', with cavities, E E, in combination  
with section, B', in two parts, constructed and arranged together as and for  
the purpose herein described.

61,343.—WASHING MACHINE.—C. H. Knox, Mt. Pleasant,  
Iowa.  
I claim the bolt, R, in combination with the clamp, T, friction roller, L,  
plates, K and F, as set forth.

61,344.—SELF TRACK-LAYING CAR.—Jesse S. Lake, Smith's  
Landing, N. J.  
First, I claim the combination with a track car or vehicle of the within-  
described revolving track consisting of an endless series of trucks or floats,  
I, P Q, L, connected together by flexible chains, cords or straps, K, and  
operating in the manner and for the purpose specified.  
Second, I claim the combination with the runners or ways, H, H', cylinder,  
G, and crutch, M, of the flanges, B B' B', the latter, B', being hinged or  
pivoted to admit of lateral adjustment in order to vary the course of the car  
or vehicle, substantially as described.

61,345.—CARTRIDGE BOX.—M. C. Leonard, Washington,  
D. C.  
I claim a cartridge line with sheep skin, or other equivalent material, and  
for the purpose set forth.

61,346.—WINDOW SHADE SUPPORTER.—T. J. Marinus, In-  
dependence, Iowa.  
I claim, in a window shade, the combination of the clamp composed of the  
lever, H, the hollow frame, F, and spring, I, with the cord for raising the  
shade, all constructed in the manner and for the purpose herein set forth.

61,347.—QUARTZ CRUSHER.—Carlile Mason, Chicago, Ill.  
First, I claim the conical crushing disks, m, having their faces corrugated,  
substantially as shown, and arranged to operate in connection with each  
other, as set forth.  
Second, The tension frame consisting of the rods, y, and the keys or wedges,  
a, arranged to operate in connection with the crushing disks, m, as shown  
and described.  
Third, In combination with the tension frame as above described, I claim the  
spring levers, and the set screws, e, arranged and operating as and for  
the purpose set forth.

61,348.—BUNG FOR BEER BARRELS.—J. E. McBeth, New  
Orleans, La., assignor to himself and J. W. Chamberlain.  
First, I claim the rubber ring, D, substantially in the manner and for the  
purposes described.  
Second, I claim the combination of the parts, B and C, substantially in the  
manner and for the purpose described.  
Third, I claim the combination of the parts, B C and D, substantially in the  
manner and for the purposes described.

61,349.—INSTRUMENT FOR GUIDING TAILORS IN CUTTING  
OUT COATS AND VESTS.—Herrman Mengel, Philadelphia,  
Pa.  
I claim a plate, A, and adjustable strip, E, in combination with an adjust-  
able plate, B, adjustable strip, C, and strip, D, or its equivalent, the whole be-  
ing constructed, graduated and arranged substantially as and for the pur-  
pose described.

61,350.—MODE OF PRINTING ON GLASS.—Isaac L. Miles,  
Charlestown, Mass.  
I claim transferring an impression form of elastic type having a rounded or  
curved surface to flat plate or sheet of glass by rolling the latter over and in  
contact with ways arranged adjacent to and having a curvature corresponding  
with that of the face of the form of type, as described.

61,351.—CENTER BOARD AND BOX FOR VESSELS.—D. P.  
Nickerson, Cleveland, Ohio.  
First, I claim the arrangement of a metallic center board constructed  
with the two sides, G G, the brace, I, and stay bolts, H, in combination with  
the metallic box, B, for the purpose and in the manner set forth.  
Second, The portable metallic center board box constructed with braces,  
C, and angle irons, D, as and for the purpose set forth.

61,352.—WASHING MACHINE.—George Palmer, Littlestown,  
Pa.  
I claim the washing cylinder, D D, as constructed with the revolving bars  
or rollers, F F, into which cylinder the clothes are placed and secured to be  
washed with the balls, I L, constructed as shown and described, the washing  
apparatus being arranged and combined with the gear wheels, a and e, and  
the crank handle, E, operating substantially in the manner herein described  
or the purposes specified.

61,353.—CLOTHES WRINGER.—George Palmer, Littlestown,  
Pa.  
First, I claim placing ribbed metal longitudinally in hard wood rollers for  
clothes wringer, when covered with elastic substances, substantially as herein  
set forth.  
Second, I claim, in combination with clothes wringer rollers as described,  
the pressure lever, Q, balls, v, or other equivalent, spring and rack bar, Y,  
operating as and for the purposes herein specified.

61,354.—DEVICE FOR PREVENTING COLLISION OF LOCOMO-  
TIVES.—Henry Payne, Sr., Mount Vernon, Ohio.  
I claim the affixing to locomotive boilers one or more tubes in such manner  
as herein described, as that by letting steam into them from the boiler, a shaft  
will be driven or forced forward from each tube to meet any opposing object,  
and thus prevent collision of the locomotive with the object opposing, or  
much diminish its force.

61,355.—WRENCH.—John L. Peake (assignor to himself and  
Louis Guillauder), New York City. Antedated January  
6, 1867.  
I claim the recessed face, a, on the jaw, A, in combination with the tooth,  
b, on the jaw, b', so that the tooth, b, will travel forward and forward by means of  
the rack, X, segment, M, and lever, C, all arranged for joint operation, so as to act  
on cylindrical boxes or pipes of different diameters, all in lines at uniform  
distances from their centres, substantially as herein set forth.

61,356.—COAL SCUTTLE.—John Pfeifer, Philadelphia, Pa.  
Producing a close joint between the body, A, and the bottom, B, of the said  
coal hod, by means of the concavo-convex bead, a' b', substantially as and for  
the purpose described.

61,357.—SHUTTLE BINDER FOR LOOMS.—J. C. Poland, Jr.,  
Auburn, Maine, and B. R. Cotton, Lewiston, Maine.  
We claim a shuttle binder made as a lever, pivoted at or near its centre,  
when arranged with adjusting screws, d' d', by which the angle of the binder  
can be changed and the binder can be fixed in position, substantially as de-  
scribed.  
Also, in the arrangement claimed above, mounting the pivot of the binder  
on a screw, w, by which the distance of the whole binder is adjusted with refer-  
ence to the opposite side of the shuttle box.

61,358.—FLY TRAP.—M. M. Preble, Kokomo, Ind.  
I claim the combination of the boxes, A and E, and slides, G and F, the said  
parts being constructed and arranged substantially in the manner and for  
the purpose set forth.

61,359.—STEREOSCOPE.—De Witt S. Rawson, Peru, Ill.  
I claim the picture box, H, the swinging front, D, and shelves or brackets,  
E E, substantially as herein described.

61,360.—ICE CREAM FREEZER.—John E. Robinson, Boston,  
Mass.  
I claim, in combination with a freezing vessel, a, the arrangement of a series  
of cream cylinders, b, to be simultaneously rotated within the same, which  
each cylinder is so mounted as to be capable of disconnection from the driv-  
ing mechanism and removed from the freezing vessel, without disturbing the  
other cream cylinders, substantially as set forth.  
I also claim, in combination with such an arrangement and method of oper-  
ation of the cylinders, the stationary scrapers, held in place during the rota-  
tion of the cylinders, substantially as described.  
Also, mounting each cylinder on a screw shaft, and so as to be removable  
therefrom, substantially as and for the purpose described.

61,361.—TRUNK LOCKS.—E. A. G. Roulstone, Roxbury, Mass.  
I claim the combination of the spring bolt, l, and tumblers, e, or locking  
mechanism, when constructed and arranged to lock and unlock substantially  
as set forth.  
Also, combining with the projection, o, of the bolt, the flange, r, with the  
pin, p, for receiving the strain of the bolt, substantially as described.

61,362.—PORTABLE WATER POWER.—Abram Rowe, Ma-  
comb, Ill., assignor to himself, Lorenzo F. Whitman and  
Reson A. Bowie.  
First, I claim a portable hydraulic motor for operating machinery, consist-  
ing of the propeller or screw wheel, B, enclosed in a case, E, and located in  
the central bottom portion of a boat, A, as herein shown and described.  
In combination with the wheel, E, arranged as shown, I claim the sluice, C,  
in the front end of the boat having its sides converging as represented.

61,363.—ABRASIVE POWDER.—Jesse Russell, Bath, Maine.  
I claim abrasive powders, made by reducing and grading the material above  
described.

61,364.—METHOD OF UTILIZING WASTE EXTRACTS OF FIB-  
ROUS PLANTS.—George E. Sellers, Sellers' Landing, Ill.  
First, I claim the vegetable extract of fibrous plants, when obtained in the  
process of preparing paper stock, in the manner and for the purpose  
substantially as described.  
Second, The utilization of the vegetable extract of cane (arundinaria macro-  
sperma) and other fibrous plants, when obtained from them in the process of  
preparing their fiber for paper stock without other chemical agencies than  
water or heat, as a new article of commerce.

61,365.—BASE BURNING STOVE.—Charles J. Shepard, Brook-  
lyn, N. Y.  
First, I claim the use or employment of the chamber, B, constructed and  
operating substantially as described, for the purposes set forth.  
Second, I claim in a stove with the upper or reservoir chamber constructed  
substantially as shown, a door placed in position relatively to the grate as  
shown for the purposes herein indicated.  
Third, The use or employment of water, substantially as shown, for the  
purposes set forth.

61,366.—HYDRANT.—Joseph Nottingham Smith, Jersey City,  
N. J.  
I claim the tubular flanged valve, F, operating substantially as herein speci-  
fied.  
I also claim the inverted cup-shaped valve seat, D, in combination with the  
valve, F, substantially as herein described.  
I also claim the arrangement of the hydrant as herein set forth.  
I also claim the combination of the filter tube, L, with the valve, F, sub-  
stantially as and for the purpose herein set forth.  
I also claim the flexible packing, Q, in combination with the cups, P and T,  
substantially in the manner and for the purpose herein specified.

61,367.—WINDOW-SCREEN FOR RAILROAD CAR.—F. U.  
Stokes, Cincinnati, Ohio. Antedated Jan. 6, 1867.  
I claim a sash frame for a railway car window, constructed in such a man-  
ner that the upper half may be set with glass, and the lower with wire gauze  
or analogous material, the whole being combined together in the manner and  
for the purpose herein set forth.

61,368.—MODE OF PRINTING PHOTOGRAPHS.—Joseph Wilson  
Swan, Newcastle-upon-Tyne, England.  
First, I claim the preparation and use of colored gelatinous tissues, sub-  
stantially in the manner and for the purpose set forth.  
Second, The mounting of undeveloped prints, obtained by the use of col-  
ored gelatinous tissues, in the manner and for the purpose set forth.  
Third, The retransfer of developed prints, produced as above described,  
from a temporary to a permanent basis.

61,369.—MANUFACTURE OF SHOE LACINGS.—J. P. Ferrell,  
North Bridgewater, Mass.  
I claim combining with friction surfaces having a relative reciprocation, a  
co-operating mechanism which shall draw or feed the strip between these  
surfaces, the said strip being used for the purpose set forth.  
I also claim in combination with such an arrangement or organization  
mechanism for releasing the strip from the nippers, mechanism for separat-  
ing the abrading surfaces, and mechanism for returning the parts to normal  
position, substantially as set forth.

61,370.—HANGER BOX FOR CRANK SHAFTS.—Thomas Welch,  
Churchville, N. Y.  
First, I claim providing the hanger journal of the crank shaft or other  
journals of harvesters, with self-adjusting or self-lining bearings, or boxes,  
substantially as and for the purpose shown a described.  
Second, The application of the wedge, E, with or without a set screw when  
used in combination with the box in which the journal revolves, for the pur-  
pose of compensating for the slack that might otherwise occur, by the wear-  
ing away of the parts.  
Third, The set screw, S, in combination with the self-adjusting or self-lining  
boxes of harvesters, substantially as and for the purposes set forth.  
Fourth, In combination with the self-lining or adjusting boxes and journals,  
the reservoir substantially as shown, and for the purpose described.  
Fifth, In combination with a set screw and self-lining or self-adjusting boxes  
in harvesters, the cap, I, or its equivalent for the purposes described.

61,371.—PROCESS FOR PURIFYING AND CLEANSING SIZING  
FOR PAPER, ETC.—Norman J. Wells, Huntington, Mass.  
I claim the use of alum or other equivalent mentioned, in the process of  
preparing sizing, when used and applied in the manner substantially as herein  
described and for the purpose set forth.

61,372.—CHEESE VAT.—Amos Westcott, Syracuse, N. Y.  
I claim the method above described of constructing, attaching and render-  
ing adjustable, the leg, D, substantially as and for the purposes set forth.

61,373.—PISTON FOR STEAM ENGINES.—William D. Whit-  
more, Boston, Mass.  
I claim my improved ring section and wedge piston as made not only with  
its ring sections and their wedges wholly within and supported by a case, C,  
separate from and to be attached to the cap, B, by screws, but also having the  
cap, B, applied to the piston rod, A, the whole being substantially as and for  
the purposes herein before set forth.

61,374.—BED BOTTOM.—Newel J. Willis, Waltham, Mass.,  
assignor to himself and Ammi Brown, Boston, Mass.  
I claim the improved construction of the slat lifter, B, and arrangement of  
it, in combination with the slat, A, the whole being as described, the part,  
c, of such lifter under such arrangement, being made throughout its  
length to bear against the underside of the slat and the springs to extend  
wholly below the part, c, and the slat as explained.

61,375.—SEED DRILL AND CULTIVATOR COMBINED.—John P.  
Zeller, Bourbon, Ind.  
I claim, first, The frame, A, constructed as described, with the hinges, d

loop, g g, studs, h h, loops, f f, studs, 55, and tongue, D, in the manner and for  
the purposes herein fully set forth.  
Second, The wheels, B and B' with corrugations upon their inner faces and  
connected to the frame by the short axle, cog bars, P, and metal sides in the  
manner and for the purposes specified.  
Third, The arrangement of the shaft, C, with cog segments, O O, which  
mesh into the cog bars, P P, and used for elevating or depressing the frame,  
A, in the manner as set forth.  
Fourth, The drag, L, with shoe, M, and roller, constructed as set forth, and  
used with the frame, A, as specified.  
Fifth, The arrangement of the detachable drilling device, G, constructed  
specified and used in combination with the frame as specified.  
Sixth, The corn cultivator attachment, H, when used with the frame, A, as  
set forth.

61,376.—A GIG OR MACHINE FOR RAISING THE NAP UPON  
CLOTH, COMPOSED OF THE FOLLOWING ELEMENTS.—An-  
ton Zschille, Grossenhain, Kingdom of Saxony, assignors  
to L. T. Downes.  
I claim, first, A gig or machine for raising the nap upon cloth, composed  
of the following elements. 1st, A mechanism for moving the cloth through  
the machine so as to present plane surfaces to the action of the teazles. 2d,  
One, two or more pairs of plane surfaced independent teazle plates with  
mechanism for moving the same, while maintaining their parallelism with  
the cloth, in arcs of a circle or otherwise, so that each plate shall contin-  
uously move toward the cloth, sweep transversely and in contact with the cloth  
from the center toward the sides thereof, and then recede, and return toward  
the center.  
Second, I also claim the means herein described for engaging or disengag-  
ing the cloth with or from the teazle plates, and regulating their pressure of  
contact, substantially as shown and set forth.  
Third, I also claim the method of teazling cloth by machinery, substantially  
as herein shown and described, that is to say by imparting to the teazling  
surfaces the following motions, viz: to and from the cloth and also at right  
angles to the run thereof, so that the nap shall be raised crosswise from the  
center or thereabouts to the sides as described.

61,377.—SAW SET.—W. A. Alexander, Mobile, Ala.  
I claim the combination of the lever, B, pivoted in the block, A, with the  
recess, b, and the set screw, c, in the block, A, forming an adjustable saw set,  
constructed and operating substantially as herein described.

61,378.—KINDLING FIRES.—Dexter B. Andrews, Fort Wayne,  
Ind.  
I claim a composition for kindling fires compounded from the materials  
and substantially as set forth.

61,379.—COMPOSITION FOR THE MANUFACTURE AND PRE-  
SERVING LEATHER.—Robert Andrews, Milwaukee, Wis.  
I claim making the composition out of the materials named in the manner  
named and to secure to me the right of using such a composition, and of apply-  
ing it to leather in the process of manufacture or after it is manufactured  
and to all articles made of leather, disclaiming every thing but the composi-  
tion.

61,380.—CORSET AND SKIRT SUPPORTER COMBINED.—Wil-  
liam Bacheller, West Newberry, Mass.  
I claim in combination with an ordinary corset, the skirt supporter for  
which Letters Patent were granted me May 23, 1866, adapted to be worn a d  
secured together in the manner as and for the purpose specified.

61,381.—GOVERNOR.—William Bakke, New Media, Pa.  
I claim the arrangement upon the mill shaft of a pivoted governor ball and  
arm to actuate a detaching apparatus for the water gate levers, substantially  
as described.

61,382.—PAPER RULING MACHINE.—George A. Ball, San  
Francisco, Cal.  
First, I claim the division of the cylinder into any number of sections with  
nippers working between each section and the introducing the movable  
blocks, i i i, between each nipper to preserve the circular form of the cylinder  
in combination with the nippers, substantially as described.  
Second, Covering the cylinder with india-rubber cloth, Z, and placing upon  
the edge of each section where the nippers strike a strip of gutta percha, Z',  
as described and for the purposes set forth.  
Third, The gages, rolls, h, and lock nuts, m m, affixed to the feed board,  
in combination with the feed board I.

61,383.—APPARATUS FOR AMALGAMATING ORES.—Abner  
Bassett, Virginia City, Nevada.  
First, I claim the barrel, e, or its equivalent, having a hollow shaft, o, pas-  
sing through it, by which heat is introduced by exhaust steam or otherwise,  
substantially as described and for the purpose set forth.  
Second, I claim the hot-air shell or bath, g, for the purpose of applying  
heat by exhaust steam or otherwise, to the outside of the vessel containing  
the ore, and for the purposes set forth, whereby obtained an amalgam more  
freely, substantially as described and for the purpose specified.  
Third, I claim the application of steam or heat to the ore or pulp, both  
through an around it, without coming in direct contact with it, the said ore  
or pulp being confined in some suitable vessel, said vessel being inclosed in a  
shell or bath, for the purpose herein set forth.

61,384.—EDGE PLANE FOR BOOTS AND SHOES.—Willigan  
Bayhouse, Portland, Oregon.  
First, I claim an edge plane having a cutter, D, with straight and concave  
edges, and the adjustable slotted guard, F, placed over the said cutter, sub-  
stantially as described and for the purpose set forth.  
Second, The guay, C, B, with slots, b and b', and the screw, I, for elevating  
the cutter, in combination with the screw, G, and thumb nut, H, substantially  
as described and for the purposes set forth.

61,385.—SORGIUM STRIPPER.—Amos Bean, Canaanville,  
Ohio.  
First, I claim an improved cane stripper, formed by the combination of the  
adjustable spring knives, B, and projections, e e, the whole being constructed  
and arranged substantially as herein shown and described.  
Second, The combination of the levers, C, with the spring knives, B, and  
box or frame, A, substantially as herein shown and described, and for the  
purpose set forth.

61,386.—SIFTING DEVICE FOR GRATES.—Jacob Beesley, Phil-  
adelphia, Pa.  
First, I claim a grate, d, for receiving the ashes and cinders, in combination  
with the sliding frame, C, and projections, e e, the whole being constructed  
and operating beneath the fire grate of a stove heater or furnace, substan-  
tially as and for the purpose herein set forth.  
Second, The ribs, c c, with their recesses, x x, in combination with a grate  
d, and with the sliding frame, C, and its lugs, e e, the whole being arranged  
substantially as described.  
Third, The combination of the detachable box, B, grate, d, and sliding  
frame, C, the whole being constructed and operating substantially as specified.

61,387.—COWL.—W. F. G. Beeuwkes, Holland, Mich.  
I claim the arrangement of the guard pipes or casings, C F, plate, H, and  
short cylinder, J, for projecting the roof from the heat of the chimney, sub-  
stantially as here in shown and described.

61,388.—APPARATUS AND PRESERVER FOR RECTIFYING AL-  
COHOL AND OTHER SPIRITS.—Jean Gustave Bequet, Paris,  
France, assignor to himself and Moritz Pinner, New  
York City.  
First, I claim introducing chemicals into a rectifying or distilling column  
for the purpose of analyzing or purifying, in whole or in part, the contents of  
such column.  
Second, Introducing such chemicals at option either in their natural state  
or mixed with water or other suitable liquids.  
Third, Introducing water into a rectifying or distilling column, in such a  
manner as to cause the mixing of such water with all or part of the contents  
of such column for the purposes herein set forth.  
Fourth, Introducing such chemicals, pure or mixed, or such water into  
such column, substantially by the means or in the manner herein described.  
Fifth, Constructing a rectifying or distilling apparatus, in such a manner  
that one boiler or still can supply and keep at work two columns, or at op-  
tion more, at a time.  
Sixth, Constructing a rectifying or distilling apparatus, in which two col-  
umns, or at option more, are connected with each other in such a manner  
that thereby the contents of one column can, in whole or in part, be passed  
into another column without interrupting the process of rectification, distillation,  
analysis, or condensation.  
Seventh, Constructing an analyzer of a series of tubes or cylinders, substan-  
tially like the upper compartment of the analyzing condenser, G, herein  
described.  
Eighth, Constructing a condenser of a series of tubes or cylinders, substan-  
tially like the lower compartment of the analyzing condenser, G, herein  
described.  
Ninth, Constructing the analyzing condenser, G, of a series of tubes or  
cylinders, and dividing the same into compartments, substantially as de-  
scribed and for the purposes named.  
Tenth, Providing a rectifying or distilling apparatus, with a vessel, V, for  
the reception or distillation of chemicals, substantially as described and for  
the purposes set forth.  
Eleventh, Providing a rectifying or distilling apparatus with one or more  
tubs or vessels, T, for the mixing of chemicals with liquids, substantially as  
described and for the purposes set forth.  
Twelfth, Supplying each or all of such tubs, T, with a float or self-acting  
stop cock, 56, for the purpose of regulating the quantity of liquid required in  
each tub.  
Thirteenth, The three-way stop cock, 75 76 77 78, or any desirable number  
of the kind, constructed substantially as herein set forth and used as de-  
scribed.  
Fourteenth, Connecting such three-way stop cocks with steam chambers or  
pipes, substantially in the manner and for the purposes herein set forth and  
described.  
Fifteenth, The pipes, 15a and 15b, in connection with pipes, 16a 16b 16c and  
16d, and stop cock, 94 95 and 9, the whole substantially arranged in such a way  
as to enable the condensed impurities of any given column to be returned or  
directed into any given still, substantially as described and for the purposes  
set forth.  
Sixteenth, Regulating by means of valves, 27a and 27b, the quantity of va-  
pors required in any given column for rectifying or distilling purposes, all  
substantially as described.

61,389.—CHURN.—Jehial Borst, East Cobleskill, N. Y.  
I claim the arrangement of the two washers, the outer revolving faster than  
the inner, and both being operated by means of shaft, S, toothed plate, n, idle  
wheel, o, and gear wheel, m', with its shaft, m, the several parts being con-  
structed and used as and for the purpose specified.





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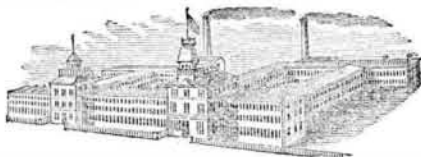
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CONTENTS: Weight of slabs to produce boiler plates, from 2 feet to 9 1/2 feet, superficial measure, from 1/4 inch to 1 inch in thickness, allowing for heating, rolling, and cropping.

Weight of piles to produce boiler plates (from 2 feet to 9 1/2 feet, superficial measure, from 1/4 inch to 1 inch in thickness, allowing for heating, rolling, and cropping).

Weight of piles to produce sheet iron (from 10 feet to 18 feet, superficial measure, from 1/4 inch to 1 inch in thickness, allowing for heating, rolling, and cropping).

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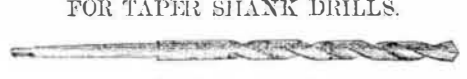
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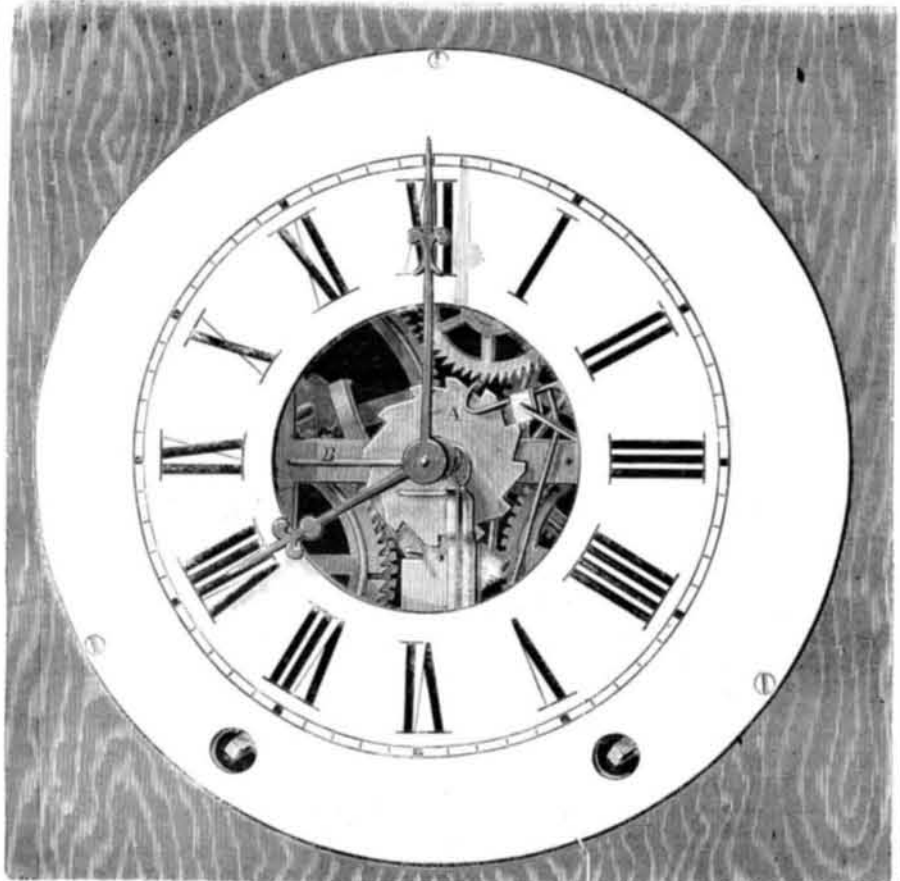
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Improved Differential Movement.

The three engravings herewith presented show different views of a device for taking the place of the cannon wheel, lifting wire, and connections, which constitute the differential movement. Fig. 1 is a clock face showing a front view of the attachment; Fig. 2 a face view of a temporary model, and Fig. 3 a reverse view of the same. The hour hand is rigidly secured to the ratchet wheel, A, which turns on the spindle that carries the minute hand. This wheel is held against the face plate by a spring, B. The minute hand is attached to the spindle by a sleeve in a manner similar to the ordinary way of attaching the hour hand. The minute hour spindle has attached at the rear of the face plate two cams, C, the outer one of which gives a reciprocating movement to a long lever, D, and carries a shorter one—jaw seen at E—which is pivoted at F, and has a projecting pin, G, that engages with the teeth of the wheel, A.

The operation is as follows: When the clock is to be set to the hour the minute hand is turned two-thirds or five-sixths of a revolution as the cams may be set. The pin, G, by the movement to the lever, E, is carried out of the wheel teeth and transversely across and up sufficiently to again engage a tooth before the hour hand receives any motion. The wheel is then turned by the pin one tooth or one-twelfth of a revolution. From this brief description watch and clock makers may understand the device and its objects. The inventor claims it is cheaper than the common differential movement in a clock, that there would be no pin and washer to be lost, that applied to a watch the face could be made permanently fast and the wheels would not get changed by watch tinkers. It is the subject of a patent obtained March 13, 1866, by Hoban J. Holden, of Genoa, N. Y. He will furnish any additional explanations.



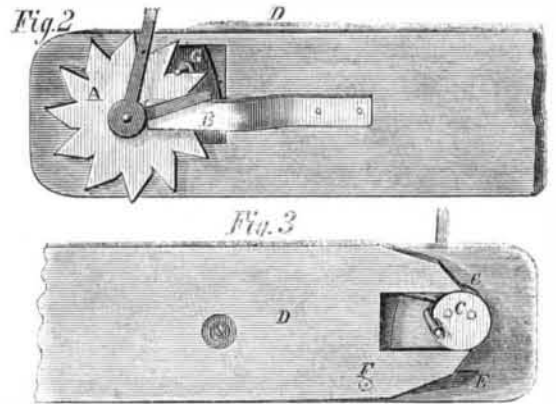
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Should the question be propounded to any one haphazard; "what machine is most generally used?" he might reply, the sewing machine. But although the number of these useful machines which have been manufactured and sold within the past fifteen years is almost incalculable, and they are in common use, we are disposed to award the palm to the pump. Just glance at the variety of form, the numberless adaptations of one single principle, to say nothing of the designs

of leather, brass, wood, lead, glass, india-rubber, canvas, and combinations of several of these; pumps in which the bucket is the valve; those with flexible barrels or cylinders and others with them of rigid material; those the barrel of which works on a fixed piston, and others having a compressible air chamber for ejecting the water. Every manufacturer seemed to suppose his pump could be of little value unless it was as different from all others as it was possible to make it; still the same principle is at the bottom of all of whatever style and operation; that of atmospheric pressure, vulgarly called suction.

As pumps are the most generally used of machines, so they are the most generally abused. The common household pump is used to pump turgid and sandy water, which rapidly cuts away the valves, of whatever material made. It is left with water in the barrel and the valves allowed to freeze. It is exposed to the action of the salts held in solution in spring water, and is operated by the mechanically inclined, by adults, children, and by anybody. It is evident, then, that the sim-



pler the pump, the fewer its parts, the stronger its build, the better it is fitted for its work. That pump which fulfils these conditions and can be repaired by any person of ordinary ability, being made of material not likely to injuriously affect the water for domestic purposes is the best common pump for ordinary uses. The object, then, of the improvers of the pump who are continually claiming to perfect this implement should be to make it so simple and durable that getting out of order shall be nearly impossible unless from legitimate wear. Such a pump would, to be sure, largely diminish the amount of work now expended in repairs, but as these repairs are not the special business of any workshop but are generally done by home tinkers, this loss would not be felt except as diminishing vexation and annoyance.

which are the product of the fancy, and we find among the list, pumps with one bucket and those with two in the same chamber; pumps with and without valves; those with valves

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Those who have made inventions and desire to consult with us, are cordially invited to do so. We shall be happy to see them in person, at our office, or to advise them by letter. In all cases they may expect from us an honest opinion. For such consultations, opinion, and advice, we make no charge. A pen-and-ink sketch, and a description of the invention should be sent, together with stamps for return postage. Write plainly do not use pencil nor pale ink; be brief.

All business committed to our care, and all consultations, are kept by us secret and strictly confidential. Address MUNN & CO., 37 Park Row, New York. In Order to Apply for a Patent, the law requires that a model shall be furnished, not over a foot in any dimensions, smaller, if possible. Send the model by express, pre-paid, addressed to Munn & Co., 37 Park Row, N. Y., together with a description of its operation and merits; also, remit the first Government and stamp fees, \$18. On receipt thereof we will prepare the patent papers and send them to the inventor for examination, signature, and oath. Our charge for preparing the drawings and all the documents, with attendance to the business before the Patent Office, is \$25, for the simplest cases, up to \$35, and more, according to the labor involved. Our charges are always very moderate. When the patent is allowed, \$20 more is paid the Government, making a total of \$81 for the simplest case.

The model should be neatly made of any suitable materials, strongly fastened, without glue, varnished or painted. The name of the inventor should be engraved or painted upon it. When the invention consists of an improvement upon some other machine, a full working model of the whole machine will not be necessary. But the model must be sufficiently perfect to show, with clearness, the nature and operation of the improvement.

New medicines or medical compounds, and useful mixtures of all kinds, are patentable. When the invention consists of a medicine or compound, or a new article of manufacture, or a new composition, samples of the article must be furnished, neatly put up. Also, send us a full statement of the ingredients, proportions, mode of preparation, uses, and merits.

The average time required to procure a patent is six weeks. We frequently get them through in less time; but in other cases, owing to delay on the part of the officials, the period is sometimes extended to two or three months, or even more. We make a special point to forward our cases as RAPIDLY AS POSSIBLE.

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Preliminary Examination.—This consists of a special search, made at the U. S. Patent Office, Washington through the medium of our house in that city, to ascertain whether, among all the thousands of patents and models there stored, any invention can be found which is similar in character to that of the applicant. On the completion of this special search, we send a written report of the result to the party concerned, with suitable advice. Our charge for this service is \$5.

If the device has been patented, the time and expense of constructing models, preparing documents, etc., will, in most cases, be saved by means of this search: if the invention has been in part patented, the applicant will be enabled to modify his claims and expectations accordingly.

Parties desiring the Preliminary Examination are requested to remit the fee (\$5), and furnish us with a sketch or photograph, and a brief description of the invention.

Where examination is wanted upon more than one invention, \$5 for each must be sent, as each device requires a separate, careful search. Address MUNN & CO., 37 Park Row, New York.

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If either party wishes a postponement, either of the day for closing the testimony, or of the day of hearing, he must, before the day he thus seeks to postpone is past, show by affidavit, a sufficient reason for such postponement.

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