SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES

Vol. XIX.---No. 26. [NEW SERIES.] NEW YORK, DECEMBER 23, 1868. $3 per Annum, [IN ADVANCE.]

Hydrostatics Applied to Revolving Iron Forts.

So long as human nature is governed by ambition and the pursuit of gain, whether in individual enterprize or for national agrandizement, so long shall we be subject to wars with their attendant calamities; and while these results are inevitable we should guard against the consequences by being on the alert for the foe.

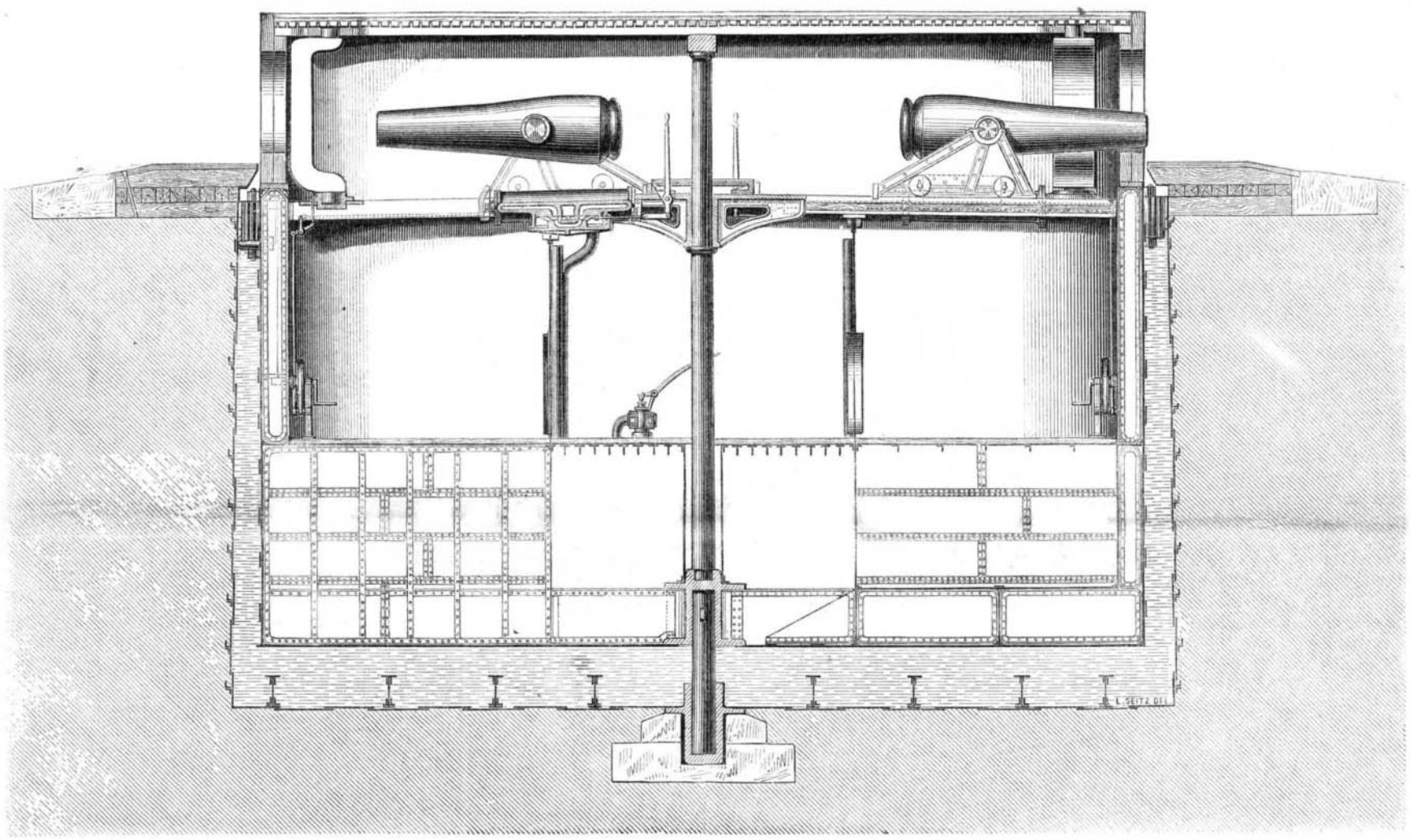
We now see all the most enlightened nations of the world constantly experimenting, planning, and devising the best means of defence and offence; we see the best moral, military, scientific, and mechanical minds more or less brought to bear upon these two problems: How best to defend ourselves against an enemy's ships; how best to assail an enemy with ships.

Of late the science and skill in the manufacture of large guns is so far in advance of the power of resistance in ships when they are clad up to their maximum load, that they are not at all reliable; and the old fortifications are still more unreliable; hence the necessity of corresponding improvements in forts and other means of defence. When our largest guns consisted of 68 pounders, it was but pastime for the brick mason and stone cutter to construct fortifications. But now 600 or 1000 pounders have reduced all such fancy structures to worthlessness. It is now guns *versus* forts, iron and steel against iron and steel. But the iron-clad is now more than a match for the old fort, and iron plating has heretofore proved a failure, therefore we see great energy and anxiety exhibited by foreign nations to protect their fortifications. To preserve their guns in barbette they mount revolving turrets on the top, and in the angles of their forts, but this as a naval defence will probably prove a useless experiment. Other experiments are proposed, such as adopting "rifle pits" on a large scale, with guns so mounted that they "get themselves up and fire over the top of the pit and then get themselves down again to be reloaded;" and, lastly, it is proposed to mount a miniature fort on trucks to be propelled by a locomotive engine; this locomotive fort to travel on an annular inclined railway, coming round from behind a shield or casement moving up the incline and firing over the embankment, and then gracefully retiring. These somewhat novel devices tend to show the drift of the practical mind, the utter incapacity of the present mode of constructing fortifications, and the consciousness that something must be done, and that soon, to solve these two great problems; yet no two engineers can agree, but leave them, as they found them, unsolved. We know, too, that the very existence of some Governments depends on the solution of one or the other of these problems. We know that Governments that ve the most forts, really have the least confidence in them, and are surrounding them with iron-clads, floating batteries, and torpedoes. One writer says that the British Admiralty have made a "lamentable failure of the Plymouth forts and Gibraltar shields," and it is well known that in some cases they plate the tops of the fort, leaving the base exposed, when they know by actual experiment that a single shot has "splintered" granite blocks fifteen feet back from the face, or point of impact. Naval tactics are being reversed; forts were formerly used to protect ships, but now ships have to protect forts, such as they are. Doubtless the true theory is mutuality; one auxiliary to the other.

In view of these facts it is claimed that the Revolving Hydrostatic and Pneumatic Fort satisfactorily solves the first problem; how best to defend ourselves against an enemy's ships. Accompanying this article will be found a plan, reduced from working drawings drawn to a scale, to admit of eight 15-inch guns, and is 58 feet diameter on the gun deck. It gets its flotation by being inclosed in an iron tank, say two feet greater in diameter than the bottom section of the fort, having the intermediate space filled with water, or, in very high latitudes where there is danger of freezing, oil may be used. The upper section or fort proper is constructed entirely of iron or steel plates of any given thickness; in this plan it is proposed to use three thicknesses of six-inch plates, which are now considered sufficient to resist any projectile that has been contemplated. It is only a question of buoyancy, whether this fort be one foot or four feet in thickness, which is governed by the superficial area of the base or lower section immersed, so that, it will be seen, this system is unlimited in its capacity. The lower section is divided off into store rooms for provisions and ammunition, and into quarters for officers and men.

A fort of this kind weighing 1,500 or 2,000 tuns may be revolved easily with three or four men by simply turning a crank, thus enabling us to handle eight 15-inch, 20-inch, or 30-inch guns.

Suppose science and mechanical skill should produce wrought iron or steel guns of 50 tuns or more, with a 24 or 30-inch caliber, which may be considered at least possible, they could not be used on board of ships, nor do we think they would be practical in the present fortifications; but on this hydrostatic principle such guns can be trained as expeditiously as guns weighing only ten tuns; and by an ingenious arrangement of compressed air, which takes up the recoil of the monster pieces and runs them again into battery by the power of a single arm—together with other appliances to facilitate loading, opening and closing the port stoppers—Captain Ryan's system insures a great saving of men and time. And it will be borne in mind that this revolving fort effectually counteracts the advantage heretofore held by ships under steam and constantly in motion while in the act of bombarding; for this fort can also be kept in constant motion, so that the lateral range when got, need never be lost on a moving ship—overcoming the most difficult part of gunnery in fortifications. This fort can also be located in positions where it would be almost impossible to erect an ordinary fort; as for instance, in low marshy land or on quicksand, this fort may be set up in a few days by simply excavating a pit large enough to receive the iron tank, when the foundation is ready for an eight gun fort, equivalent to a 50 gun fort of the present construction; and if it be exposed to attack from land, it still maintains its permanence as a defensive work, as nothing short of insanity could induce infantry to assault such a fortress; for so long as provisions and ammunition hold out a garrison of fifty men in its iron shield could never be made to surrender. The attack of a siege train would be quite as futile; starvation or treachery might capture one of these forts, but powder and ball never.



RYAN & HITCHCOCK'S REVOLVING IRON FORT.

All the advantages pertaining to the revolving fort may be transferred to a floating battery by constructing a solid timber platform or shield 150 feet square, more or less, from 12 to 20 feet deep, with proper fastenings, and plated with iron, to be ram and shell proof, leaving in the center a well-hole through the shield of requisite diameter to receive the fort, in which case it will be seen that the timber shield is a substitute for the iron tank, with this difference that it has no bottom but the sea. In case of necessity this immense shield is towed into position and securely moored. To an obstruction of this kind rams and iron-clads will give a wide berth. With a few of these eight-gun batteries moored in the Narrows and East River, well supported with the revolving forts on either shore, New York can safely defy all the rams and iron-clads of the world. "In peace let us prepare for war," but in time of peace it is not necessary to construct these timber shields, but it would be prudent to construct the iron battery or turret so far as fitting it up, then taking it down and storing it for future use. Beside the intrinsic value of this battery, it gives additional facilities for using torpedoes or other submarine works.

War is expensive at best, and war machinery is growing more and more expensive, but expenses are not taken into consideration as against a nation's existence, safety, or means of defence; in fact it is maintained by some of the most enlightened minds of the day that the more expensive and elaborate the defensive works required, the greater the safety against invasion, therefore the cheapest, which is doubtless the true theory, especially for iron-producing states.

But this does not prove that cheaper engines of war may not be devised, and still be more effective. That this system of defence is the cheapest may be demonstrated by comparison with the cost of one of the British iron-clads. Let us take the *Minotaur*, which was built as a model war ship, fully up to the times. The weight of her hull alone is 7,586 tuns —five times more than this fort. Armor and backing 6,124 tuns—four times more than the fort; engine and coal 2,540 tuns —more than half as heavy again; making, exclusive of armament, 16,250 tuns, within a fraction of ten times the weight of this fort. The hull alone cost £365,365; with double armor and backing, would cost £757,350—equal to about $3,756,750. But the *Bellerophon* is claimed to be an improvement, though smaller and lighter, with a saving of a quarter of a million pounds. These statements are taken from a paper read by Mr. Reed before the Royal Society, London. We are not prepared to say just what this fort will cost, but other things being equal, it will be nearly in proportion to their respective weights, not exceeding $400,000, or about one tenth of the *Minotaur*; and it would be safe to say that our Government could build ten forts and equip them for action, for every single iron-clad of this type that any foreign Government could build and send against us, at the same time the commander of such iron-clads might hesitate to attempt to pass two of these forts and one battery properly located in the Narrows below this city.

But the construction account is not the only or most unfavorable comparison, the cost of maintaining these sea monsters on a war footing is simply enormous, to say nothing of the deterioration, even when laid up in ordinary. It requires a strong detail of officers and men to keep them afloat and in repair, whereas this fort is never in danger of sinking, or getting out of repair in its machinery, and in time of peace these forts are to be laid up, by drawing off the water and allowing the fort to settle down on its ways, when the iron has only to be protected from oxidation, and a detail of one man to a fort would be a sufficient guard. When in a case of emergency, by having connection with a reservoir, in twenty minutes the fort could be set afloat, all in fighting trim. Neither is this all the saving by this system, as in case of the batteries they may be manufactured to order (exact duplicates), and stored in all the arsenals and seaports, when, if occasion requires, they could be put into working order with all their equipments in thirty days, more or less, according to the emergency.

The discrepancy between their respective powers of offence and defence, may be presented in a few words. The forts are to be absolutely impregnable against any and all shot that can be hurled against them; each one armed with a battery of eight or more guns, double, or perhaps quadruple the weight that will be carried by any iron-clad; with projectiles in proportion, delivered with almost the accuracy of a rifle marksman, at the rate of one every minute, against the sides of a ship made of iron and wood, probably in its strongest parts equivalent to eight inches of iron; for it must be remembered that ships of this type are not entirely clad with iron, the exposed parts being of about the same value for defence that a cigar box would be to a minie ball. Nor would their iron plating amount to much more in resisting projectiles of 500 or 1,000 pounds, propelled with from 100 to 200 pounds of powder; and it remains to be seen what effect a thousand pound shell would have, exploded alongside of an iron-clad, charged with fuminating powder, gun-cotton, or nitroglycerin. Doubtless the ship would be relieved of some of its iron plates. Of course no nation will ever send ships to fight such forts, but only to pass them, if they could.

Further information may be obtained by addressing James T. Ryan, St. Nicholas Hotel. Patent pending.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Is the Age of Invention at a Stand Still?

MESSRS. EDITORS:—A period of forty years past may be termed the "Age of Invention." We can compare the present with the past: the old stage-coach, or diligence, in Europe, with the steam locomotive of to-day; the old sail ships with the present steamships. We can find in our mother's list of old letters large foolscap sheets, sealed by wax—no envelopes—and bearing date four or five weeks from that at which they were received; and we can compare these missives with those transmitted by our present postage system and the telegraph. We call to mind, also, the great improvements in the art of printing. Then glance at the machinery used in the department of agriculture—mowing machines, horse rakes, reapers, thrashers, plows, cultivators, etc.—and consider the manual labor of forty years ago. The department of war, with ironclads, breech loaders, etc., furnishes a striking comparison. The household, with sewing machines, washing machines, and a number of minor labor-saving machines, still adds to the comparison. We could continue in this strain indefinitely, but we are led to the question: "*Is the age of invention at a stand still?*" That is, will there be, in the coming forty years, so great an improvement in the modes of transit as there has been in this past forty years? Will there be as wonderful an improvement in the means of transmitting messages? What improvements are we to have in the arts? Is the science of to-day to be still more revolutionized? Will the farmer be aided as much in the future as he has been in the past? Is the age of invention at a stand still? Forty years from now will tell! Inventors, have you among you a Stephenson, a Watt, a Jacquard, a Morse, a Fulton, and a Howe? Will there be with you, forty years to come, an Ericsson or a Hoe? Your deeds are to be inscribed on the tablet of time. Will your names stand in the list alongside of these illustrious ones? The field is large, and it is merely fenced in—the space is open, and rich crops will repay the tilling!

We hazard an answer that the coming forty years will witness some marvelous improvements. That wonderful agent, electricity, is only yet half harnessed. We now, for a few cents, send word to, and hear from friends a thousand miles away, it being inconvenient only as regards time. Will we not, some day, sit down to a family telegraphing machine and send messages by lightning, without the bother of the mail, and the inconvenience of writing at all?

We speed over the ground, "rattling over bridges," whizzing through the forest, journeying from New York city to San Francisco in seven days; but will it be done in seven hours? No! is the answer of to-day. An old authority on railroads, Wood, in 1825, wrote in his able work: "Nothing can do more harm to the adoption of railroads than the promulgation of such *nonsense* as that we shall see locomotive engines traveling at the rate of 12, 16, 18, and 20 miles per hour!" A later authority on this subject has added, "an express train on the Great Western Railway, drawing 59 tuns, has traveled, for three hours, at the rate of 63 miles per hour!" (Ritchie on Railways). Comment is unnecessary. Will the Pneumatic process of transmission effect the coming great stride from seven days to seven hours, for time across the continent? *Why not?* No running off the track; no collisions! Really, the "coming man" need not drink in going from New York to California!

Look around you, inventors, and see the endless labor yet to be saved. A thousand and one wants stare you in the face. Steam is yet to be half utilized. Who is the coming man for this? Is it Ericsson with the solar heat and "Sun engines?" Why, almost at the moment of writing, a sewing machine is being bothered with, because it pulls the work, from the fact that all machines are defective in that the feed is only at one side of the work. Who is the coming man for this?

There is no end to the wants of the present day. Will the next forty years supply them all? Time will tell. N. F. P.

Paterson, N. J.

Burning of Powder in Fire Arms.

MESSRS. EDITORS:—I notice in No. 21, current volume of SCIENTIFIC AMERICAN, page 330, an article headed "Carefulness in the Management of Fire Arms." Now, I perfectly agree with you as to the necessity of keeping a gun clean, but differ with you in other respects. I am over fifty years old and have made gunnery my business, making many experiments. The dirt that collects in a gun barrel will not explode or burn, even by bringing a red hot iron in contact with it. You carry the idea that only a limited amount of powder will burn, and that a gain twist will foul more at the muzzle than at the breech. This is the case with the breech loader, but with the muzzle loader the dirt is driven down at each loading, and if you are able to get your ball down to the powder there will be no danger of bursting the gun.

Now I will give a detail of an experiment that I made about ten years ago in Marshall, Michigan. I spent one day with three men to assist me. I had a heavy target rifle, cast steel barrel, weighing 32 lbs., and carrying 120 round balls, or 50 conical slugs to the lb., and the slugs were one inch long. It was a fine, still morning in the winter, after a snow that fell that night without drifting. I measured accurately one half mile on the ice of the Kalamazoo millpond, and commenced with a light charge of powder after first driving a slug ball through the barrel with the breech pin out, and saving the ball in order to compare it with those fired at the target, but not hitting anything but skipping along in the soft snow until finally they would stop without a scratch or a bruise, just as they left the rifle. After finding one from the first or small charges, I increased my powder half an inch more in depth in the barrel, and throwing clean snow in front of the gun in order to detect if any powder was thrown out unburnt, and then adjusting my sight until I could hit the target. I kept on in this way until I used six inches of powder in depth, measuring from the breech at each charge. The result was that each half an inch of powder raised or carried the ball about three feet higher at each increase of charge, and no more dirt in front of the gun; and each successive ball or slug was stove up, or more properly "upset," and showed the impression of the grooves or rifling still further up, until the last filled them from butt to point. Now this proves not only that all the powder burns, but burns instantly before the ball starts, or else it would not upset it any more with a large charge than a small one. I think it impossible to throw out a single grain of powder if you filled the barrel full with a ball on top of it to confine it; for before the pressure of the gas comes against the ball the fire has found its way between the grains to the utmost extremity of the place of confinement; and for this reason, in blasting rocks every grain must explode before anything gives or else there would be no need of more powder for a deep heavy blast than for a light one. But powder when not confined acts differently, for when the first grain ignites it has plenty of room to escape without being forced through the other until it catches from one grain to another, except what resistance the atmosphere produces.

There is one thing I forgot to mention, viz., that by using a very small charge of powder and by wetting the wad or patch very wet there will a few grains stick to the wad or patch unburnt, for the heat is not intense enough to dry it before it gets out of the gun, but with a large charge it will not only dry the wet powder but burn the patch as if a red hot iron had been pressed against the butt of the ball with a patch drawn over it.

M. L. ROOD.

Denver, Col.

THE strain of belts is always in the direction of their length; thus holes cut for the reception of lacings should be either oval, the long diameter in line with the belt, or placed in the line of a double or V-shaped angle across the width.

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office

FOR THE WEEK ENDING DECEMBER 8, 1868.

Reported Officially for the Scientific American.

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

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

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.*

84,670.—PUNCHING MACHINE FOR TIN AND SHEET METAL.—John Annear, Philadelphia, Pa.

I claim the rotary bed plate, C, the punch, D d', and the "former," E e', the same being constructed and arranged to be operated together, in any suitable frame, A B, substantially as and for the purpose described.

84,671.—DEVICE FOR PREVENTING INCRUSTATION IN STEAM GENERATORS.—Robert Breckenridge Baker and Charles James Adolphus Dick, Paris, France, assignors to the American Anti-Incrustation Company.

We claim an insulated mass or block of carbonaceous matter, suspended within a boiler, near one end of the same but connected by a wire to the shell of the boiler, near the opposite end of the latter, all substantially as set forth.

84,672.—SHAFT COUPLING.—Charles Bennitt, Bristol Station, Ill.

I claim the combination of the band, H, journal, G, pulleys, E E, jaws, C and D, with the rods, B B, as and for the purpose herein specified and shown

84,673.—MACHINE FOR CUTTING EYELETS.—George B. Brayton, Providence, R.I.

I claim an apparatus for cutting tubing into sections, for eyelet blanks or other purposes, consisting of a series of revolving cutters, a a, a surrounding revolving jacket, B, for holding and conveying the tubing, and a pressure cylinder, C, all in combination, substantially as described, for the purposes specified.

Also, making the openings, D, in the jacket or casing, B, for holding and conveying the tubing inclined to the axis of the series of cutters, a a, as herein set forth, for the purposes specified.

84,674.—SELF-REGULATING AIR VALVE FOR STEAM HEATERS.—Moses P. Breckenridge Meriden, Conn.

I claim inserting the frame, B, which holds the spring, C, into the case or cylinder, A, by this means allowing the said cylinder to be constructed in one piece, and thereby doing away entirely with the use of packing.

84,675.—GAS BURNER.—Julius Bronner, Frankfort-on-the-Maine, Prussia.

I claim, 1st, The use of a slit as aperture to a gas burner, the top exterior surface of the head of which is concave or funnel shaped, substantially as and for the purposes set forth.

2d, The combination of the two gas burners thus made, in other words, of two fish tail slit burners, to form a compound economic or double burner, or of one such fish tail slit burner, with an ordinary burner, substantially as described.

3d, The use of the fish tail slit burner head or insertion, c, constructed and applied substantially as herein set forth.

84,676.—RUFFLING DEVICE FOR SEWING MACHINE.—Reuben Brooks, Jr., and William N. Manning, Rockport, Mass.

We claim, 1st, The combination of the bar, B, slotted plate, H, and screw, G, all constructed substantially as described, and for the purpose set forth.

2d, The rubber presser, D, combined with the bar, B, and tension plate, E, substantially as specified.

3d, The adjustable spring guide, F, in combination with the tension plate, E, and presser, D, as specified.

84,677.—FASTENER FOR LASTS.—Hiram Brown, Burton, O.

I claim the slide, D, so arranged in such relation to the last, B, that the lower end of said slide is received directly into the last, in the manner as and for the purpose set forth.

84,678.—MECHANICAL MOVEMENT.—A. R. Buffington, U.S.A.

I claim the improved mechanical movement, consisting of devices herein described, by means of which angular motion may be transmitted from one body to another, increased in velocity to twice, or reduced to one half, the power varying, but the motion uniform, according as the one from which the initial motion proceeds acts upon the other, by means of surfaces on which slide or oil parts connected with this other body, or through the intervention of projections, axles, hubs, or pins simply, or these with blocks or wheels fitted on them, sliding, rolling, or moving in contact with surfaces of said other body, as substantially herein described.

84,679.—GAS RETORT.—Mills L. Callender, New York, assignor to himself and Sidney L. Holdredge, Greenburg, N. Y.

I claim a double retort, made, arranged, and operated in the manner and for the purposes substantially as described.

84,680.—WEATHER STRIP.—E. Carpenter, Carbondale, Pa.

I claim, 1st, The arrangement of the weather strip, A, having the two projections, a a', with the slots, e e', in the plates, E E, attached to the jamb, or in the jamb itself, substantially as herein described and shown.

2d, The combination of the strip, A, levers, B D, and door, when the several parts are constructed and arranged to operate in the manner described and shown, and for the purposes specified.

84,681.—FRICTION CLUTCH PULLEY.—Andrew B. Clemons, Ansonia, Conn.

I claim, 1st, The screw-threaded levers, E and E', in combination with the friction plate, D, and threaded hub, C, of the pulley, for the purpose of drawing the two parts together, substantially in the manner and for the purpose specified.

2d, The shoe, F, in combination with the levers, E and E', and pins, a a, for the purpose of operating the said levers upon the hub, C, of the pulley, substantially as herein set forth.

84,682.—WAGON TONGUE SUPPORT.—N. A. De Long, New Scotland, N. Y.

I claim the combination of the tongue and axle with the slotted adjustable plate spring, embracing the standard, F, and having four points of support, as and for the purpose set forth.

84,683.—LEVER GRAPNEL.—Edwin B. Dewey, Pontiac, Mich.

I claim the bearing lever, F, provided with suitable hook, G, when connected with curved and pointed levers, A and B, and constructed and operating substantially as and for the purposes herein set forth and described.

84,684.—HORSESHOE.—Fordice W. Edison, Port Huron, Mich.

I claim the arrangement of the expanding springs, C C, on the toe piece, E, to which the wings, A A, are pivoted, substantially as and for the purposes set forth.

84,685.—MAGAZINE GUN.—W. R. Evans, Thomaston, Me.

I claim the combination of the fluted shaft, D, which contains one or more flutes, with the fixed spiral thread or partition, B, substantially as specified.

84,686.—APPARATUS FOR DEODORIZING, DESICCATING, AND MIXING MANURES.—Henry S. Firman, New York city.

I claim, 1st, Arranging a close desiccating and mixing pan, constructed substantially in the manner described, and provided with mixers, as set forth, in a close heating chamber over a furnace or heating flue fitted with dampers, and constructed substantially as described.

2d, The combination of the supply hopper, constructed substantially as described, with a close desiccating pan for the purpose of introducing the material to be treated in the pan, as set forth.

3d, Combining, with a close desiccating and mixing pan, a deodorizing or absorbing chamber for the purpose of utilizing the offensive gases, and avoiding the nuisance occasioned by their escape from the pan.

4th, Creating a circulating of the air and gas in the desiccating pan by by means of an air pump affixed thereto, through the agency of pipes, arranged substantially as described.

84,687.—FASTENING FOR HORSE COLLARS.—James P. Force and John E. Force, Constantine, Mich. Antedated November 21, 1868.

We claim the combination with the collar A A' A'', of the flexible straps or latches, B, and catches, C, constructed and employed as and for the purpose described.

84,688.—CAR SPRING.—Perry G. Gardiner, New York city.

I claim the arrangement of an india-rubber spring, H, surrounded by steel spring rings, n m, and w, and india-rubber springs, J, enclosed in a suitable casing, E, in combination with a plunger, P, acting upon the central india-rubber spring, H, the whole being combined and operating together, in the manner and for the purpose substantially as described.

84,689.—GAS-LIGHTING DEVICE.—E. P. Gleason, New York city.

I claim, 1st, Charging or filling an elastic gas-tight receptacle with gas, and then supplying the same to a burner connected thereto for lighting purposes, whether the same shall be accomplished in the precise manner shown, or in an equivalent manner.

2d, The combination with an elastic gas-tight reservoir, B, of a suitable case, A, and an exit-pipe, D, constructed and operating substantially as described for the purposes specified.

3d, The combination of an elastic gas-tight reservoir or receptacle, B, case, A, and exit pipe, D, with a spring, G, placed either within or beneath the receptacle, B, for the purposes fully described.

4th, The combination of the case, A, receptacle, B, exit pipe, D, and spring, G, with the cord, E, for the purposes set forth.

84,690.—MACHINE FOR STRETCHING HAT BODIES.—William C. Griswold, Brooklyn, N. Y.

I claim the combination of the tip-stretching mechanism consisting of the spokes, c', and star, m, with the brim-stretching mechanism, consisting of inclined stationary arms, d', and the expansible or spreading arms, i, all constructed arranged, and operating substantially as herein specified.