pulleys 24 feet; the pulleys are on horizontal shafting. The shaft carrying the driver's pulley is about 3 feet higher than the crank shaft. The driving pulley revolves towards the other bringing the "slack" part of the belt on top and between the pulleys causing it to cover more of the circumference of the pulleys than if run the reverse. We use no tightening pulley and the belt never slips. We drive with this belt a flouring mill of 3 "runs" of stone with all the necessary machinery; the engine is rated sixty horse power. Experience teaches me to use pulleys of large diameter, good lengths of belt and quick motion to transmit the greater power.

W. R. COOPER.

Sag Harbor, L. I., July 3, 1865.

The Lead Ball on a Steam Jet.

MESSRS. EDITORS:—The explanation requested in your valuable paper, No. 2, current volume, in regard to a bullet sustained and rotated by a jet of steam or water seems to me to be of no very difficult character. It is well known that every such bullet or ball has two centers, the center of dimensions or imaginary one, and that of weight or the real one, as no ball can be manufactured so true that the weight would be equally distributed around the center of dimensions. If now the center of weight should be on the right hand side of the imaginary center, the left hand side being lighter, receives the force of the steam in a greater degree, and will, therefore, be turned from left to right, and vice versa. If a ball could be so constructed that the imaginary would be the real center, or if it could be placed over the jet in such a manner that the two centers would be in a vertical line and exactly over the center of the jet, then the ball would certainly not rotate. That part of the jet which has not actually to support the ball rises above it and surrounds it, thereby preventing it from falling off, or rather, on account of its unevenness, from being thrown aside; the water or steam around it, possessing exactly the same power as that beneath. If the diameter of the jet is smaller than that of the ball it will certainly not balance the same, but will throw it aside there being no power left to prevent it from falling. A. V. BRIESEN.

New York, July 5, 1865.

Large Pulleys vs. Small Pulleys for Belts.

MESSRS. EDITORS:—I have been much interested in the various articles, communications, comments, etc., that have appeared in your paper on the power-transmitting capacities of belts. There is, however, one point that I think has not been touched upon, and that is the diameter of the pulleys over which the belts run. I think that a belt traveling at a certain rate per minute will give more power, without being so tight as to break out the lace holes or heat the shafting, when driven by a large pulley than by a small one; or in other words, that a belt will impart more power when drawing a four-foot pulley at fifty revolutions, than when driving a two-foot pulley at one hundred revolutions.

It appears to me that it would take double the amount of power to make the belt slip on the large pulley that it would on the small one, and that doubling the diameter of the driving and driven pulleys is equivalent to doubling the width of the belt.

J. J. W. R.

Brooklyn, July 4th.

Peculiar Action of Belts Running on Each Other.

MESSRS. EDITORS:—As you and your correspondents are at this time interested on the subject of transmitting power through belts I would suggest an idea for your consideration which is not generally known by those who peruse your valuable paper; thus two belts, one running over the other will convey more power through them than one alone would of the same tightness. If we stitch the two belts together, however, so that they have to move as one belt they will not drive more than one half the load that they would if left to run over each other, independently. ANDREW B. ARNOLD.

Newark, N. J, July 5, 1865.

[Mr. Arnold is a close observer of long experience in machinery and we place great reliance on his opinions. The case he mentions is an interesting one and doubtless occurs from the fact that where one belt runs on the other, both being detached, each retains its individuality and transmits the force due to its velocity and width; where both are stitched together they become one, with only the tension and friction due to their width, length and velocity. We shall be glad to have the opinions of our readers.—EDS.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Skate—This invention provides a means for keeping the feet warm while skating; and this is effected by arranging a heating chamber under the foot-plate of the skate, into which may be readily placed any heated substance or body, such as soapstone, or any heating medium, such as a burning lamp; and in this way the foot-plate of the skate is kept warm, and, consequently, the feet from becoming numb with cold, and thus the pleasure of skating, particularly in the case of ladies, is greatly enhanced. The inventor of this improvement is O. W. Tatt, of No. 60 Pine street, New York City.

Hand-washing Device for One-armed Persons.—Our recent war has suggested many improvements for the benefit and comfort of our soldiers, and this is one worthy of especial attention. Perhaps no person, unless he has lost an arm or hand, can fully comprehend the difficulty of washing his remaining arm and hand. The patentee of this invention has been afflicted with the loss of one arm, and his device answers the purpose for which it is intended in a very satisfactory manner. It consists in the use of a sponge, or other suitable material, fixed to the upper surface of an open frame fitted to slide in a bed-plate, capable of being attached to the side of a washstand or elsewhere, its position being inclined so as to permit any water expressed from the sponge to run off from it through a channel in the bed plate. The hand or arm may be soaped and rubbed upon the sponge, and in this way a thorough washing or cleansing thereof can be easily and quickly effected. The inventor of the above is Gustave Dieterich, of 37 Park Row, New York, who may be addressed for the purchase of the patent or rights to manufacture.

Forging Machine.—This invention relates to a machine for forging various articles, such as nails, file shanks, spindles, etc. The invention consists in the employment of two pairs of hammers arranged and operated so as to approach and recede from each other, alternately, in pairs, and using in connection therewith a stop mechanism, feeding and cutting device, and certain other parts, whereby a simple and automatically working device is obtained for the purpose specified. John C. Jewell, of Boston, Mass., is the inventor.

Breeching Hook for Carriages,—The object of this hook is to facilitate the freeing or letting loose of a horse from the shafts of vehicles in case of sudden accidents, and consists in a novel construction of the breeching hooks, whereby the breeching straps disconnect therefrom, simply through the forward movement of the horse within the shafts, the traces, however, first having been unhooked or otherwise disconnected. And in addition to the above this hook also enables the breeching straps to be fastened and unfastened with more ease and rapidity by hand than with the use of the old styles of hooks, and it is in every respect greatly superior to them. Edwin Brown, formerly of Leominster, but now of Boston, Mass. (care of Messrs. Chickering & Sons), is the inventor.

Grain Separator.—This invention relates to a machine for separating impurities from grain, and also for separating one kind of grain from another, such as oats from wheat, etc., and it consists in the use of a series of screens and discharge spouts arranged relatively with each other in such a manner that the grain will be subjected to repeated screenings and thoroughly cleansed from all impurities, and one kind of grain separated from another, a blast fan being used and also a peculiar feeding spout in order to render the operation perfect or complete. Julius Tomlinson, of Newburgh, Wis., is the inventor.

Buckle for Skates and Other Purposes.—This invention consists in providing supplementary bearings for the journals of the tongue of the buckle, which bearings are behind the bearings which hold the said journals when the buckle is in use, and are separated therefrom by a ridge, over which the journals pass, when the journals are to be moved from one to the other. The effect of this construction is to enable the tongue to recede from the front of the buckle where the bite is made on the strap, thereby releasing the strap without difficulty and without requiring that it be first pulled out from the loop of the buckle. B. S. Lawson, 294 East Broadway, New York, is the inventor.

Bending Metal Plates.—This invention relates to a device for bending metal plates, and is more especially designed for bending armor plates for ships and other war vessels, so that they may conform to any part of the sides of the vessel and fit snugly thereto. The invention consists in the employment of a series of adjustable bars in connection with patterns and clamps, constructed and arranged in such a manner that the bars may be very readily adjusted to form a curved or winding bed corresponding to any portion of the exterior surface of the hull of a vessel, so that each plate may, with the greatest facility be bent to conform to the portion of the vessel to which it is to be attached. John W. Easby, of Washington, D. C,, is the inventor.

Head Rest for Car Seats.—This invention relates to a head rest for car seats which can be readily attached to or detached from the seat without in the least degree injuring it, and is of such a form and construction as to admit of being carried in a traveling bag or even about the person. The advantages of this are of course manifest to all, as it promotes not only the comfort and ease of the person, but also relieves a journey of the tediousness usually attending it, and supplies a want heretofore long felt. W. R. Phelps, of Elizabeth, N. J., is the inventor.

Hand Stamp.—This invention relates to certain improvements in that class of hand stamps in which a chemically prepared or inked ribbon is used to furnish the types with the requisite supply of ink or other material to produce the desired impression. The invention consists, first, in the employment of an adjustable head carrying the reels on which the ink-prepared ribbon is wound, in combination with the longitudinally sliding stem to which the handle is attached, and with the type plate in such a manner that easy access can be had to the reels and ribbon, and that the head with the type plate can be turned on the stem in either direction according to the direction in which the impression is to be taken on the paper. The reels lie in cavities in the sides of the head, the end pieces of which form the bearings for the axles of the same. The type plate is secured to the head by a nick and segmental slot in combination with a friction spring, in such a manner that the same can be readily removed and replaced or taken out to change the types, and when in position it is not liable to work loose spontaneously. The table which supports the material on which the impression is taken is made adjustable and removable so that its hight can be regulated or that it can be taken off and replaced at pleasure. Horace Holt, of Brooklyn, N. Y., is the inventor, and has assigned his right to W. W. Secomb, 264 Broadway, New York.

Beater Press.—This invention relates to certain improvements in that class of presses in which the article or substance to be compressed and baled or packed is previously compacted in the press box by means of a beater which is so arranged as to serve the office of a beater and follower. The invention consists in a novel arrangement of levers and a rope in connection with a suitable windlass whereby a very compact and powerful lever arrangement for operating the follower is obtained. The invention also consists in an improved windlass so constructed and arranged that it may, by a very simple manipulation, be made to operate the beater or follower in either capacity, that is to say when worked as a beater or follower. The invention further consists in certain means for facilitating the heoping of the bale and its discharge from the press box. Loyal C. Field, Galesburg, Ill., is the inventor.

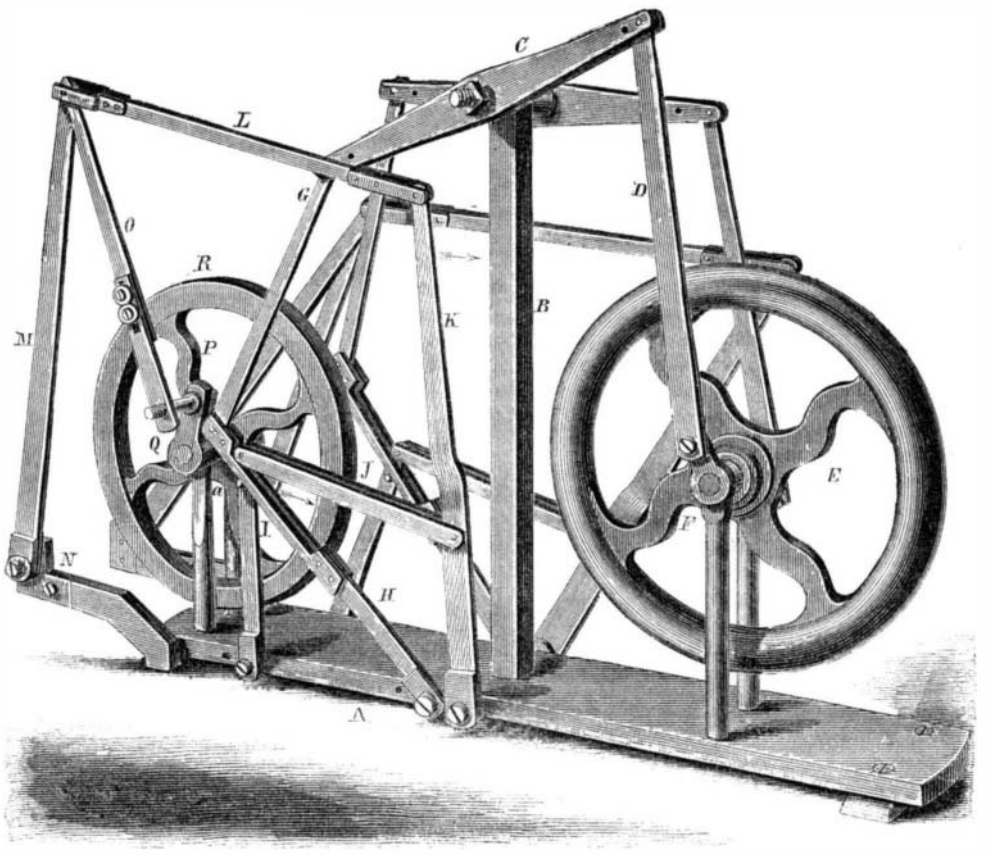
THE "American Sleeping Car Company," which proposes to "construct, run and operate," has just been incorporated by the Legislature of Connecticut.

Improved Multiplying-power Machine.

The appended article is furnished by the inventors.

"This machine consists in a combination of toggle joints and levers. A represents a platform; B a standard forming the fulcrum for the working beam, C. The rod, D, connects a large heavy fly-wheel, E, mounted on a shaft, F. The other end of this working beam connects by a rod, G, with a lever, H, forming a toggle joint which rests on the supporter, I. Its lower surface forms an inclined plane, which rests on a stud, *a*, projecting from the sides of the supporter, I. The rod, J, forms the connection between the supporter, I, and the lever, K. This lever connects by a rod, L, with the lever, M, having its fulcrum on the end of the link, N. The rod, O, extends to the crank, P, secured to the shaft, Q, on which a second fly-wheel, R, is mounted. The rods, L and M, form a second toggle joint. This combination of the toggle joints and levers shows the remarkable property of gaining power and space at the same time, without loss of velocity, provided that all parts of the machine are in the proper proportion. Any moving force applied at the crank, P, of the second fly-wheel, R, brings the toggle joint, M L, out of its position, pushes the lever, K, forward in the direction of the arrow, sets the supporter, I, in motion, and raises the toggle joint, H G, and working beam, C, with constantly-increasing power, thus transmitting motion to the fly-wheel, E. The power gained by this machine is at the toggle joint, H G, equal to twice the force applied; at the lever, K, three times, and at the second toggle joint, L M, again twice; that is, in all, twelve times. Allowing one-third for friction, the gain in power is equal to eight times the force applied. By suspending weights from the fly-wheels on the model, it will be found that a weight of two ounces, suspended from the fly-wheel, R, is capable of balancing a weight of one pound, suspended from the fly-wheel, E, or eight times its own weight. This gain in power can be increased by the addition of toggle joints. The exact proportion of the space gained by this machine is, for all cases—3·515 : 4·240 : 2, or very nearly 3 : $\frac{4}{2}$—which formula cannot be explained at present for want of room. If the crank of the fly-wheel, E, has a length of 9 inches, the working beam must be raised 18 inches, but the supporter, I, has to travel only through a space of 12 inches; the lever, K, passes through 36 inches; the second toggle joint, M L, through 24 inches, and, consequently the crank of the second fly-wheel, R, must be only 12 inches long; that is, very little more than the crank of the first fly-wheel. From this it is evident that, by this machine, power and space is gained at the same time without loss of velocity, for as soon as the fly-wheel, R, is set in motion, the whole machine commences to work immediately.

"This machine can be used with advantage for increasing any motive power For further particulars address the inventor, Henry Bickel, Elizabeth, N. J.



BICKEL'S POWER-MULTIPLYING MACHINE.

Cost of Stopping Railway Trains.

Much has been written about the cost of stopping a train of cars, from the great wear and straining of the machinery, rails and road-bed. A few years since the directors of a prominent railway became so impressed with the magnitude of the cost of merely stopping trains, that they discontinued several way stations where there was a very considerable traffic, withdrawing a good many trains from other stations, all to the serious inconvenience of the public and a very considerable loss of traffic to the company. In a discussion at an annual meeting of shareholders of a company, the chief executive officer stated that in his judgment, it cost a dollar for every stoppage of a common passenger train, and for through and express trains a larger sum. A somewhat matter-of fact shareholder entered into a computation of the number of stops made by the different trains on the road, and rather surprised the railway official by showing that the mere cost of stopping the trains of the road, according to the official estimate, was more than the entire gross receipts of the road for the year. This is what you may call running a theory into the ground with a vengeance. It is a very difficult and rather unsafe matter to estimate the cost of stopping a train of cars; but its difficulty does not seem to deter a great many persons from attempting it, and so we find different persons estimating it at from thirty cents up to two dollars per stop, all confident that they have found the exact sum. Any discussion of this matter, if it could be based upon exact facts instead of preconceived and erroneous theories might perhaps be valuable; but it seems rather difficult to get at facts, and our over careful directors and managers may take some comfort from the opinion expressed by the late Association of Railway Superintendents and Engineers of New England, who, after a long series of computations and observations, came to an almost unanimous opinion, that it would not cost, averaging all the railways and trains, more than 8 cents per stop. As the gentlemen who formed this association were careful and cautious in the statement of official opinion, and were certainly experts, in the best sense of the term, we think their evidence should hereafter prevent the propagation of the rather ludicrous estimates of men who have not made this and kindred matters a special study.—*Railway Times.*

Bandoline.

Many persons have a passion for smearing their hair with various substances so as to make it smooth and shiny. We give below a list of some compounds for this purpose which was published in the *Druggists' Circular:*—

1. Irish or Iceland moss, boiled in water, and the strained liquid perfumed.

2. Quince seed, $\frac{1}{2}$ teaspoonful; linseed, 1 tablespoonful, and a pinch of white mustard seed. Boil in a pint of soft water to half, and scent with oil of almonds.

3. Boil a table spoonful of linseed for five minutes in half a pint of water.

4. Isinglass, $1\frac{1}{2}$ oz.; water, 1 pint; proof spirit, 2 fluid ounces. Dissolve the isinglass in the water by heat, add the spirit, and scent with almond oil.

5. Tragacanth, 1 oz.; rose-water, 1 pint. Bruise the gum, digest for three days, and strain.

Any of these may be colored with cochineal if required.

Boot and Shoe Machinery.

We find the following letter in the *Shoe and Leather Reporter:*—

"I have been in the way of selling 'machine-made shoes,' both sewed and pegged, ever since they were introduced. And I have often asked myself the question:—'Will the time arrive when the sewing machine will supersede the old-fashioned mode of hand sewing in shoe-making?' and as often have I answered the question, in my own mind, at least, 'No, never,' till the inventive genius of our machine makers shall produce a more perfect machine, or the operators acquire more skill in running it, and our Eastern manufacturers more moral and business honesty than to insert for the foundation of their shoes 'shoddy leather' and 'pasteboard' for an inner sole. So far as my business experience extends, four-fifths, at least, of the 'machine-sewed shoes' I have sold, the soles have ripped off from the upper, say in three weeks to as many months; and what makes it more unfortunate for the wearer, from the insufficiency of the inner sole, the shoe cannot be repaired, thus becoming a dead loss to the owner. It is a thing of almost daily occurrence, that I have shoes of this description brought to my repairing shop to be mended, and what makes it infinitely more annoying, too frequently have to be subjected to hearing a string of curses, both 'loud and deep,' on the makers of such shoes."

INDUSTRIAL EXHIBITION IN GERMANY.

We are informed by Mr. Marsh, the American Consul at Altona, in Germany, that an international industrial exhibition will be opened at that place in June, 1866. A new system of awarding prizes will be adopted. Every machine will be practically tested, and a certificate issued to the inventor, owner or agent of each machine entered in competition, showing the comparative merits of the whole of the machines under trial in their several classes. Medals and diplomas will also be awarded to the best articles. There is also another feature of this international exhibition which adds to its general interest and makes it exceedingly attractive to American exhibitors; it is an exhibition of industry as well as agriculture and agricultural mechanics. Every article in use in rural housekeeping will be admitted at the Altona exhibition; also agricultural, horticultural and floracultural products; garden designs and lawn-furniture farm, dairy and cellar products, and cattle. The exhibition will remain open forty days. Those desirous of learning full particulars of this exhibition may address Mr. Louis Martin, care of Messrs. Austin, Baldwin & Co., 72 Broadway, New York.

THE work on the Pacific Railroad is progressing rapidly. The road will be completed to Topeka, 25 miles west of Lawrence, by the first of November.

THE *Great Eastern* was expected to sail with the Atlantic Telegraph cable on the 8th or 10th of July.