### Columbia College Library.

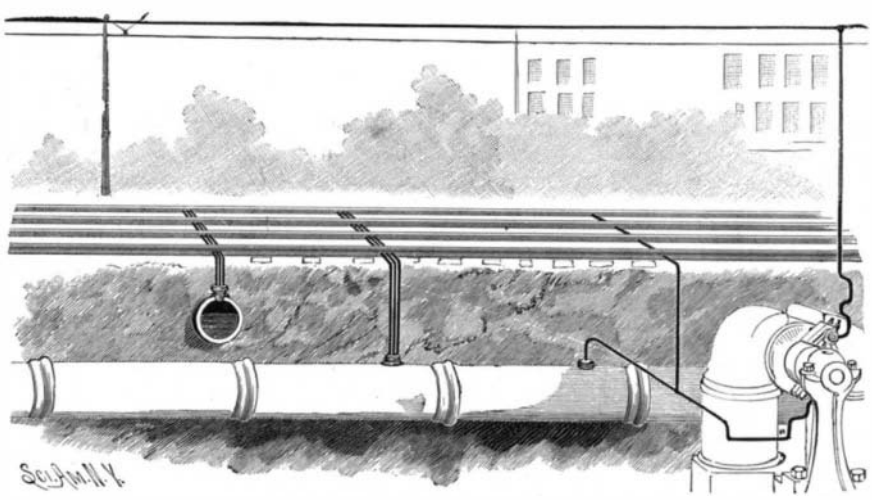
President Seth Low, of Columbia College, New York City, has given one million dollars to build the new library building, which will be erected on the new site of the college at One Hundred and Sixteenth Street, New York. Mr. Low wishes the library building to be a memorial to his father, the late A. A. Low, "a merchant who taught his son to value the things for which Columbia College stands." The new library will be erected in the center of a terrace occupying the highest point of land of the new site and will be the center of the imposing group of buildings. Access to the facade of the new building will be gained by a flight of steps 325 feet wide, which lead to a subordinate flight 140 feet wide, which, in turn, lead to the main terrace on which the library building will be erected. The classic building will be in the form of a Greek cross, and will be surmounted by a dome at the intersection of the arms. The summit of the dome will be 136 feet above the upper terrace. Bronze doors will give entrance to the portico, from which the richly ornamented vestibule will be reached. Marble doorways will lead thence to the president's room and the office, on the left and right respectively, while directly ahead the vestibule will open into the main reading room, which will occupy the whole space beneath the dome, which will be 70 feet in diameter. From the four piers of limestone at the corners will rise four richly coffered vaults, which correspond to the four arms of the building. These vaults will be 17 feet deep and will end in semicircular windows, 44 feet wide and 22 feet high. A marble and bronze colonnade, 29 feet high, will connect the piers and support a gallery adorned with statues of heroic size beneath the great windows and at the level of the second story. The colonnade gives access to an ambulatory surrounding the reading room, and thence to the halls and special libraries occupying the four wings of the building, also to the four stone staircases leading to the upper stories. The northern arm of the library is set apart for the law library, the western for the administration, the eastern for the Avery architectural library, while the southern is occupied by the vestibule and adjoining chambers before mentioned.

The second story contains the trustees' room, the president's private room, special libraries, etc. The third story will be devoted to lecture rooms, of which there will be ten, and to rooms for officers of the college. The main depository for books will be situated in the basement of the building, which is entirely above ground. The design of the library has been prepared by Messrs McKim, Mead & White. It will be constructed of buff Indiana limestone.

The library of Columbia College is one of the most remarkable collections in the country, the number of volumes in 1893 exceeding 160,000. Though primarily intended for the use of the students, a generous hospitality is extended to scholars or to any one who is making special investigations.

### PROTECTING THE PIPES NEAR ELECTRIC RAILWAYS FROM ELECTROLYTIC ACTION.

Since the general introduction of trolley roads in the streets of towns and cities, numerous cases have occurred of damage to water, gas, and other pipes from the fact that the ground has become charged with electricity, and an electrolytic action thus set up by the escaping current, quickly destroying the pipes within its influence. To obviate this difficulty the improvement represented in the accompanying illustration has been patented by Mr. Richard Watkins, of No. 1909 M Street, Sacramento, California. The current is supplied by the generator to the trolley line in the usual way, and the generator is also connected with the rails and with the pipes in the street, these pipes being connected with the rails at frequent intervals and at points where the connection may be most easily made. The conductors should be large, so that the current will flow easily, and they are brazed or otherwise firmly secured to the rails to make good contact, while connection with the pipe is preferably made by means of a plug screwed into the pipe, but without the use of lead, solder being applied to make sure of a tight joint. By thus utilizing the street pipes for return conductors the current passes freely back to the generator and there is no chance for electrolytic action.



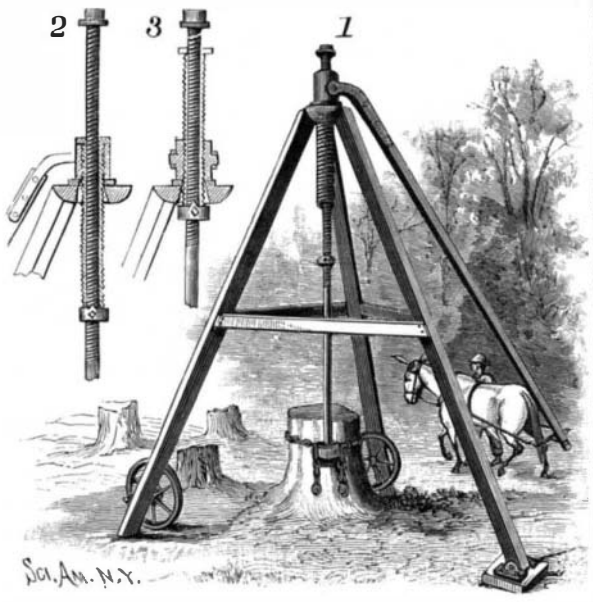
WATKINS' METHOD OF PREVENTING ELECTROLYSIS OF STREET PIPES.

### Solid Stream Forms.

Mr. D. W. Taylor, United States Naval Constructor, the gold medalist, read a paper recently before the Institution of Naval Architects, in amplification of that read a year ago on "Solid Stream Forms, and the Depth of Water Necessary to Avoid Abnormal Resistance of Ships." There was plenty of experience, he said, to establish the fact that in water only three times the draught of a ship the progress of that ship was materially retarded, but he was unable to discover any authentic case of retardation where the depth of water was six times the draught amidships. Very broad ships required a slightly greater draught than ships of ordinary proportion, while the greater the speed, the more need for great depth. This was because shoal water produced but little effect upon any but the wave resistance, and at slow speed the wave resistance was very small. It, however, increased with the speed. In the case of a very fast ship, the wave resistance might well be 10 per cent of the total resistance at 10 knots, and be 60 per cent or more of the total at 21 or 22 knots. An increase of one-fifth in the wave resistance would mean but 2 per cent at 10 knots, while an increase of one-fifth in the wave resistance at the high speed would mean an increase of 12 per cent in the retarding influences; and this, of course, means an increase of engine power.

### A SIMPLE AND EFFECTIVE STUMP PULLER.

The tripod frame of this stump puller has two of its legs provided with wheels, to facilitate moving it




WILSON'S STUMP PULLER.

about, and to the third leg is swiveled a shoe, the head block at the top being preferably of metal, and having a conical opening, a half round washer resting on the block above the opening. The improvement has been patented by Mr. James D. Wilson, of Montague, Mich. Secured in any suitable way to the stump is a lifting shaft at whose upper end is a cap, the shaft having an exterior thread, preferably of two and a quarter inch pitch, and an adjustable clutch on the shaft, below the head block, is adapted for locking engagement with the lower end of a hollow shaft through which the lifting shaft passes. The interior of the hollow shaft has a thread engaging that of the lifting shaft, and the hollow shaft has a flange at its upper end and an exterior thread, preferably of four and a half inch pitch, the hollow and the lifting shafts being shown in their normal position in Fig. 1. A nut resting on the washer receives the exterior thread of the hollow shaft, the shape of the washer and of the head block permitting the lifting shaft to be somewhat inclined without becoming cramped. Arms projecting from the nut are secured to a lever or sweep to which a draught animal is attached, the lifting shaft moving up at a speed corresponding to the pitch of its screw thread, as the sweep is carried around, but when the clutch on the lifting shaft engages with the hollow shaft the latter is also carried up with the main shaft, at a correspondingly greater speed, owing to its coarser pitch, the stump then being raised four and a half inches at each revolution of the sweep. In Fig. 2 the lifting shaft is shown drawn up to a connection with the auxiliary shaft, and in Fig. 3 the two shafts are shown elevated together. As will be seen, the stump is first started and slowly drawn up by the main shaft, and is afterward raised more rapidly by the coarser thread on the auxiliary shaft.

### Improved Boat-lowering Devices Needed.

Commander Tupper, of the Royal Navy, in a recent number of the Nautical Magazine, makes the following suggestions:

What are the means of hoisting out boats? Simply by the use of curved davits secured to the ship's side and capable of swinging outboard, as may be required, if the vessel is on an even keel; if the vessel is not on an even keel, it is with considerable difficulty, and much shoving with spars, etc., on the davit heads, that the davits on the side with "heel from" can be turned out, and of course this difficulty increases with the angle of heel. Again, assuming that the davits have been placed in the outboard position, then comes the difficulty of lowering the boats and disengaging them without bilging the boat against the ship's side or capsizing her in the act of disengaging; with the lee boats this difficulty is minimized, but with the weather boats it is always a very serious matter. It therefore amounts to this, that in cases of collision and grounding, when the boats are most wanted quickly, it is more than probable that only half the complement of boats can be got out at all.

How can these defects be remedied? I. By improving the form of davits. II. By fitting the davits with jackstays from the commencement of the curved part to the water line, fitting runners on these jackstays and securing them to the lower blocks of the boat's falls, which should disengage from the slings directly the boat becomes waterborne.

As to I. Improvements in the form of davit. I may mention: (a) That in the Royal Navy some davits are fitted with a horizontal toothrack into which a worm works; that is, cogs are fitted round the stem of the davit and a spiral screw fitted on the gunwale; this screw is revolved by a handle, and working in the cogs causes the davit to revolve in any required direction. It is a most convenient arrangement and would enable davits to be turned outboard on the side with heel from, when other means could not be effectively used. (b) I have seen a form of davit in use in the American navy which has rather taken my fancy; the davits are straight bars of iron or steel; their lower ends are T shaped and rest in eye bolts close to the waterline, their upper ends carry the upper purchase blocks of the boat's falls in such a manner that the boat is slung from the stem and stern posts, and swings in between the two davits, the tumblehome of the ship's side giving sufficient angle for the keel of the boat to rest on the gunwale of the ship, and be secured there or transported from there to amidships on a trolley if more convenient. Now with this form of davit you could always get a boat out by forcing the davits away from the ship's side by screw or hydraulic jacks, and when the boat is hanging over the water you can lower davits and boat together, keeping the boat close up to the davit head until there is no chance of her being stove against the ship's side when the falls are lowered.

(c) Another and a very good form is a curved davit pivoted and hinged on the gunwale itself, having a permanent screw jack fitted to it. In this case, when the boat is hoisted and the screws are close home, the boat rests in the curves of the davits well inside the gunwale, and when the screws are out to the full extent the boat is suspended over the water well clear of the ship's side.

In both (a) and (c) jackstays could easily be fitted; in (b) they are not necessary, but could be fitted to the davits themselves from the heads to water line. All these forms are, to my mind, much superior to the usual boat's davit.

But in addition to more efficient davits surely every well found mail steamer should carry a large kind of unsinkable boat, something after the style of the old troop boat carried in some of our troop ships, which could be launched from whichever happened to be the leeside, and also capable of automatically disengaging itself and floating if the ship sank before there was time to launch the boat.

Again, it seems practicable so to construct the bridges and promenade decks that they should automatically disengage to form three, four, or more rafts which would be left floating when the vessel has subsided. Shrouds, backstays, etc., interfered considerably with the chances of floating such rafts formerly; but now that we no longer require more than one mast, which could be fitted as a tripod mast, and that the funnel guys are quite easily slipped, I do not see that anything need interfere with these rafts floating. If the passengers accommodated themselves on them, they might at any rate have a chance of being rescued. Small depots of water and provisions could always be kept filled, which might enable the occupants to preserve their lives for three or four days, when they would almost certainly be found, even in midocean.