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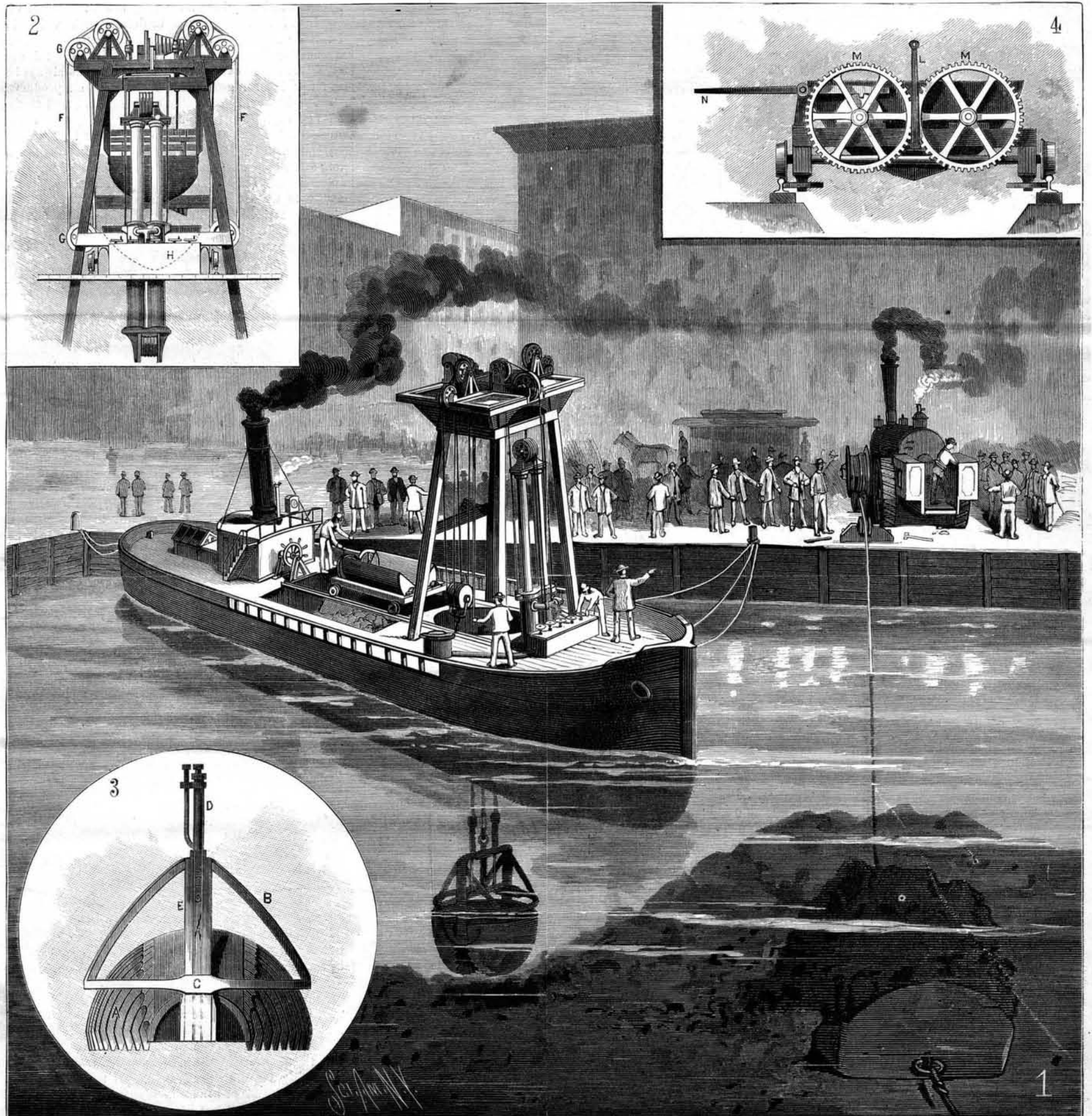
EXCAVATING AND DREDGING APPARATUS.

In the apparatus herewith illustrated two winding engines, located one on each bank of the place to be dredged, draw a dredging plow over the bottom of the water way, scraping up the earth and carrying it to the sides of the channel, whence it can be raised during favorable weather. The excavating apparatus for removing the accumulated material is worked by hydraulic power on board of a steam hopper barge. The apparatus consists of a grab bucket, which is lowered open, and when it has reached the bottom hydraulic power is so applied that the operation of closing forces the bucket into the earth. As the bucket is raised a distributing wagon, running fore and aft on a railway, comes under it and receives the load, which it transfers to and dumps into the hopper located in the center of the boat. Still further aft are the high pressure pumps for supplying

the hydraulic power, and which are driven by the steam engines used for propelling the vessel when it is not dredging.

The hull of the barge is constructed with a hopper well about in the center, and an excavator well in the bow. The latter is cylindrical and open at the bottom, and over it is a gantry frame, Fig. 2, fitted with brackets for carrying the gearing of the excavator bucket. The bucket, A, is hung by a chain over a number of sheaves on a hydraulic multiplying tackle and on the frame, and is raised and lowered by the chain and tackle. The bucket is almost hemispherical, and is made in two segments whose contact edges may be either toothed or solid. The bucket shown in the accompanying engravings is made of pointed tines or curvilinear bars of steel, bolted at their upper ends to semicircular frames, the points of the two segments intersecting when

closed. The frames have bosses to receive the pins on which the two parts of the bucket swivel. To prevent the bucket from catching against the bottom of the vessel there are curved guards, B, braced by a crossbar, C. On the suspension frame is a pair of hydraulic cylinders (one is shown at D), whose piston rods work up and down in the vertical guides, E, in which moves the crossbar. This bar is connected to the two segments of the bucket by two pairs of jointed links, so that when the bar is forced down by the action of the pistons the segments are closed. The hydraulic power for closing and opening the bucket is conveyed to the opposite ends of the cylinders by flexible hose pipes capable of withstanding a pressure of 2,000 pounds to the square inch. These pipes, F, Fig. 2; are rove over two sets of sheaves, G G, the lower blocks of which rise to pay out the hose as the bucket descends, and fall as the bucket as-



SMITH'S EXCAVATING AND DREDGING APPARATUS.

cends. The two sets of hose are arranged at opposite sides of the frame, and are actuated from a double acting supply and exhaust valve in the valve chest shown at H.

A wagon runs on rails laid over the two wells, and motion is communicated to it by the rising and falling of the excavator. A crossed wire rope runs upon a pair of V-grooved pulleys, each of which has three grooves of different diameters, so that the ratio of the travel of the wagon to the depth of stroke of the excavator may be adjusted. These pulleys, or speed cones, are placed on top of the frame. On the shaft of one of these pulleys is a cone having a spiral path around it, and on the side of the frame near the bottom is a similar cone. Around these two cones passes a pitch chain. The lower cone drives an endless chain traveling in a direction parallel with that of the railway, and to which the wagon is fastened by an arm shown at L, Fig. 4. The speed of the wagon is so varied by the cones, that it moves fastest when under the bucket. The wagon as it comes up for its load strikes against spring buffers which are held back by spring checks, and the same motion which opens the valve to lower the excavator releases these springs, which then exert their force against the wagon.

The wagon is constructed in two segments, hung on centers on which is a pair of intergearing toothed wheels, M. On one center is a disk having a recess for the tooth of the tripping lever, N. When this lever is depressed, the disk is liberated and the weight of the load opens the two segments, which close of their own weight after the load has fallen and are held shut by the tooth dropping into the recess.

The hopper well is closed at the bottom by a number of doors hinged to the keelson and raised by hydraulic rams. Each door is kept closed by a chain and pulley with a toothed wheel on the same shaft held by a pawl.

The pumps for supplying the hydraulic power are set on a cistern containing oil or water, and pump into a valve chest in front of the excavator well; the supply pipe passing first to an accumulator, then to the valve chest, and then to a second accumulator. The accumulators are of sufficient capacity to supply the cylinders for closing the doors of the hopper and to equalize the work of the pumps during the moving of the bucket. There are five ordinary hydraulic valves in the chest, from which all the movements are regulated.

Two hydraulic capstans, located in the bow, move the vessel in any desired direction. One has side chains rove round it so as to wind up on one side and pay out on the other. The forward capstan controls the forward and backward motion of the vessel.

A patent was recently issued to Mr. William Smith, of Aberdeen, North Britain, for the above described excavating and dredging machine.

The Greatest Obelisk.

The Washington correspondent of the *Cleveland Leader* writes: The Washington monument is the wonder of Washington, and its beauty the admiration of both Americans and foreigners. Already over 350 feet high, it rises from the banks of the Potomac a great white marble shaft, piercing the clouds, and backed against the blue of the sky. It is already the grandest obelisk the world has ever seen, and in the æons of the future, should the nations of the day pass away, leaving no more records of their progress than the mighty ones of the Egyptian past, it will surpass the Pyramids in the wonder of its construction. It is already higher than the Third Pyramid, and within a hundred feet of the size of the second. It is taller than St. Peter's Cathedral, and when finished it will be the highest structure in the world. To-day the Cathedral of Cologne, 512 feet high, is the tallest work in the world. Next comes the Great Pyramid, 483 feet high; then the Strassburg Cathedral, 473 feet; then the Second Pyramid, 453; then St. Peter's, 430; St. Stephen's at Vienna, 443; and St. Paul's at London, 334.

Transfusion of Blood.

The *Presse*, of Vienna, lately described an operation of the above kind successfully carried out by Professor Nothnagel in conjunction with Herr Ritter von Hacker. On account of the unsatisfactory results recently obtained in several cases by using human and lamb's blood, it was resolved to try a better method, already suggested by several physiologists. This consisted of a solution of common salt of 0.6 per cent rendered alkaline by two drops of concentrated solution of soda. The patient treated on this occasion was a young man who was in imminent danger from weakness of the heart, consequent upon loss of blood by reason of an abscess in the stomach. An incision was made in a vein in the upper part of the arm, and by means of a funnel-shaped receptacle about two pints and three-quarters of the fluid in question were introduced into the system of the patient, who is now expected to recover.

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"LABOR AND EDUCATION."

A committee of Congress has been "investigating" these subjects for some weeks past in New York city. The testimony elicited has covered a wide range of topics, and furnished much interesting reading matter for the daily press. Jay Gould has narrated, with lamb like innocence, in a story that reads like a novel, how he accumulated his colossal fortune; Dr. Norvin Green has described the telegraph systems of this and other countries in a way which makes it appear that the Western Union corporation is a great public benefactor; John Roach has told us about ship building, and how necessary are subsidies, if we would once more see a due proportion of the world's commerce done under the starry flag; Railway Commissioner Fink has explained how railway charges are regulated—how railway "pooling" prevents railway "wars"—and all for the public benefit; while many other witnesses, representing various isms, trade organizations, and the different industries, have given some important facts and a good deal of theory as to what Congress should or should not do to promote the cause of education, and for the benefit of the "laboring classes"—so self-styled by the great majority of workers who labor for a low rate of daily or weekly compensation.

This congressional committee was appointed principally in consequence of the numerous "strikes" in various parts of the country—caused generally by trade-union organizations; it has, also, been repeatedly urged that the general government should do something to promote popular education, particularly with regard to the former slave population, and so this subject was joined with the other. Primarily they are very nearly related, and any inquiry or investigation which may have a tendency to the making of wiser laws in either direction cannot be deemed useless. But how can the general government proceed in the direction of ameliorating the condition of wage earners? In this country, where all are equal before the law, it has always been held that labor must, as is the case with all products of labor, find its value according to the demand, and that any interference with the natural law of supply and demand would do harm rather than good. There is, however, a large and growing class who do not assent to this proposition, and who point to the rapidly accumulated fortunes of the masses, to the especial detriment of the poorer classes of laborers. It is this feeling, no doubt, which is most efficiently strengthening the various trade unions to-day, and in deference to which the committee of Congress was appointed.

Of the questions more particularly examined into as affecting labor, the principal ones have been the tariff, a proposed government ownership of railroads and telegraphs, convict labor, and the workings of trade unions. The first named topic has been a "live" one in every counting room, workshop, and debating club almost since the commencement of our history. From the tariff the government derives its principal revenue—but how economical it has been as a method of collecting taxes—how far it has been a prime factor in building up our industries—to what extent it has given extra wages to our workmen—these are questions on which it seems impossible to find any common ground of agreement. We have had too much theory and too small a modicum of the actual facts as they bear on each industry. The conditions are constantly changing, and the inquiries of the committee have thrown but little light upon the subject, while it is safe to say that their results will be absolutely nil as affecting tariff legislation, only as they help to educate the public. The question of government ownership of the telegraph has been agitated ever since England set the example in this direction, and was brought more directly to the attention of the committee by the recent strike of the operators.

Of this, however, as of the suggested government ownership of railroads, it may be said to require only the dullest perception to perceive that any apparent gain to labor thereby would be vastly more than balanced by added taxation. And the reasons why the government should go into such business may be very readily applied in advocacy of its taking up still other branches, until it would be difficult to fix a limit to the possible scope of its interference until the whole present fabric of society was reorganized, as, indeed, some of the witnesses advocated.

There is probably no other department of knowledge, with any pretensions to being styled a science, which is in so "mixed" a condition as the so-called science of political economy. Hardly any two writers even agree in its definition. It has been most broadly and generally characterized by an eminent authority as that which has to do with the sources and methods of material wealth and prosperity in a nation. Here, indeed, is a definition which "surrounds," if it does not get very close to the matter, and through the entire field which it suggests the committee have been making sort of guerilla raids in search of knowledge, so that Congress may legislate more intelligently.

Supposing its members actuated only by the highest motives, it is difficult to see what good can result from such rambling questionings. Theoretically, at least, we all want to have the laws so made and executed as not only to conserve the highest possible state of peace and order in the community, but so that each individual may have an equal chance to earn his or her share of the necessities, the comforts, and the luxuries of life. But when we state the matter in this way, by how much do we differ from the society which Plato would have had in his model republic?—where