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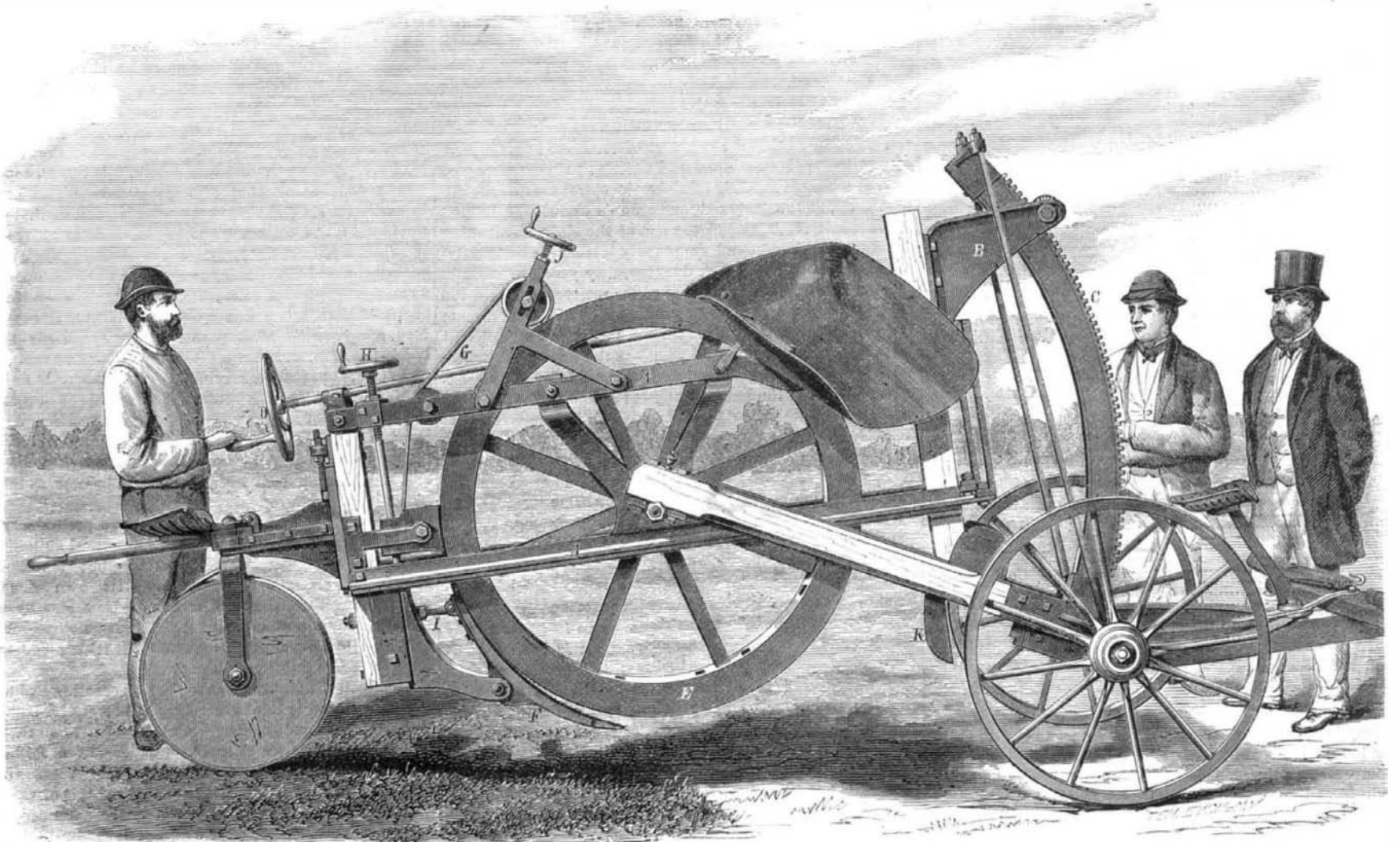
THE VIRGINIA DITCHER.

Some writer has said that drainage is to the earth what breath is to man. Good drains are earth's lungs. Science and experience have demonstrated, beyond intelligent dispute, that the producing capacity of the earth, not to mention its healthfulness, is largely in proportion to its ability to receive Nature's nourishment, namely, heat, air, and moisture, and to expel the poisonous secretions left within the earth.

The intelligent farmer should as soon expect health to his body and vigor to his mind with congested lungs, as life-

by the bracket, B, in the forward part of which is a pinion which engages with the rack, C. A worm gear, meshing with the pinion, is actuated by a rod which extends to the rear and terminates in the hand wheel, D, so that, by turning this hand wheel, the bracket pinion may be rotated on the rack; and thus the forward end of the frame, A, upon which the ditching wheel is suspended, is raised or lowered as desired. The rack, as well as the driver's seat, is supported on the forward axle. Suspended in bearings in the frame is the cutting wheel, E. This consists simply of the strong, circular, sharp-edged steel flanges, of such width apart and depth

piles regularly, convenient for refilling the ditch or removal. The construction and mode of adjusting the shoe, E, should be particularly noted, for herein, it is claimed, lies the simple and effective mechanism that renders rotary ditching practicable and very economical. The adjustable shoe and plow effectually prevent the machine from clogging; the pivoted plow, resting on the sliding shoe, is readily raised or lowered; and thus any temporary excess of earth or unexpected impediment can be removed or relieved, or any deficiency in cutting promptly made up. The pitch of the shoe is adjusted by the set screw, I, by means of which its upper or lower



RANDOLPH'S VIRGINIA DITCHER.

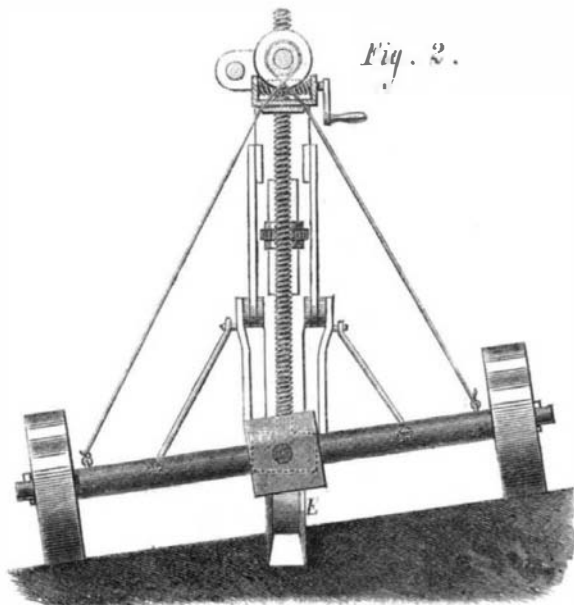
giving power in his acres when clogged, soddened, or even of heavy soil. Even the lightest soils lack porosity. Respiration, then, must be set down, by the farmer who would be successful in the largest sense, as being absolutely as essential to his acres as to himself.

Nor is the capacity to receive Nature's gifts (air, heat, and moisture), which drainage secures, the limit of its advantages. That the richest of natural soils, when undrained, will not compare with much inferior soil when drained, all intelligent persons know; but the utility and wonderful economy of the drainage system is best illustrated when fertilizers come to be used. The drained land receives and retains, almost without loss, the fructifying qualities of fertilizers; while, from obvious causes, the undrained land receives slowly, wastefully, and always coldly, the expensive helps to its productiveness. The best of fertilizers, used on undrained soil, will yield but a temporary benefit; while much poorer land, drained and fertilized, will be almost inexhaustible.

We devote the initial page of this issue to the representation of a new and simple apparatus, which, for the slow, costly, and uncertain ditching process of the past, substitutes the certain, cheap, and reliable labor of machinery. It is the invention of ex-Governor (now United States Senator) Theodore F. Randolph, of Morristown, N. J. It is fully covered by patents, both in this country and abroad, taken out through the Scientific American Patent Agency. The machines are of two constructions, one having three traction wheels, as shown in the engraving, Fig. 1, and the other having four traction wheels, differing only from the first in its adaptability to side hill cutting or use on very uneven ground. Fig. 2 represents all that is material to be shown in the latter, the four-wheeled ditcher.

Turning to Fig. 1—the three traction wheel machine—we describe as follows: A is the supporting frame, which rests on the rear on the following wheel, and is held up in front

of cut as is desired. When the frame is lowered, these cut into the ground, dividing it, and forming the perpendicular sides of a ditch. Directly in rear of the wheel, and between the flanges, is a steel-pointed shoe, F, the forward edge of which makes a horizontal cut, generally, on a line with the lower edge of the flange.



The shape of the ditch is thus defined on sides and bottom; and the earth, loosened at all points, is carried up, by the revolution of the ditching wheel and between the flanges, until it reaches the chute on the forward upward portion of the machine, out of which it passes to the ground, whereon it

extremity is drawn from or set toward the rim of the ditching wheel. Provision is thus made for the different strata of soil, frequently found under a common surface. The hand wheel, J, is simply a belt tightener. The cutters, K, on the lower end of the front post relieve the work of the ditcher somewhat, and can be made to give almost double width to the ditch, without widening the flanges. Knives of proper strength are also arranged for the rear post, by which sloping sides are made in ditching, when required.

The machine can be used for digging narrow and deep tile ditches, or open and broad ones. They vary in size and capacity, and require animal power from two horses, necessary to draw an apparatus weighing 1,500 lbs., to six horses, pulling a machine of 2,500 lbs. weight, and fitted for work in the stiffest soils. The machine does not undertake to dig stumps, or to remove stones larger than the capacity of the flanges.

From reports of practical trials, we learn, the machines cut perfectly smooth ditches, of any depth and of any width desired, the power to work them being increased in a diminished proportion to their larger size and capacity. The usefulness of the machine is not confined to ditching. As an excavator, it shows considerable capacity; the machines of six horse power dig from 250 to 300 lineal feet a minute, ten inches wide, and three or four inches thick. This will be found to be equal to 5,000 lbs. solid earth, and nearly two cubic yards, per minute. As a road maker, for pipe trenches, railway embankments, underground telegraph wires, and the like, it would seem to be of much utility. A machine is now being constructed, we understand, for digging irrigating canals in Texas. The agents suggest that, as a single machine will do the work of many farms, the club system would be the best in purchasing, thus making the cost to each person comparatively small.

Full particulars can be had by addressing Randolph Brothers, agents, 111 Broadway, New York city.