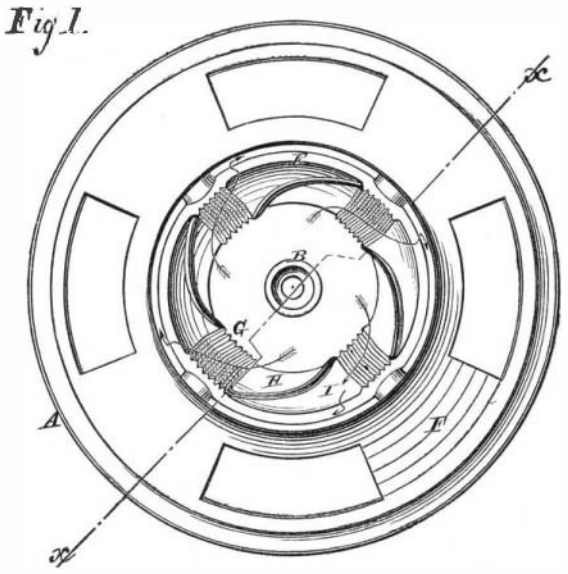
IMPROVED PAPER-PULP ENGINE.

The new feature in the engine illustrated herewith consists in the female cone, provided with groups of radial knives and guide cavities in the spaces between said groups of knives.

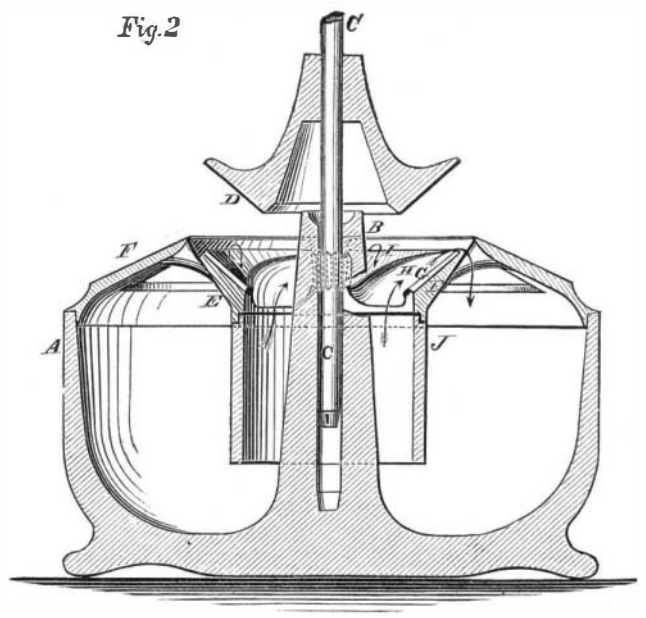
Upon the bottom of the case, A, is formed a hollow column, B, to receive and serve as a bearing for the vertical shaft, C, and which rises a little above the top of the case, A, to prevent the pulp from coming in contact with the shaft, C, and clogging and wearing it. To the shaft, C, above the top of the hollow column, B, is attached the hub of an inverted frustum of a cone, D. The lower part of the hub of the cone, D, is recessed to receive the upper end of the hollow column, B, so that the face of the male cone, D, may coincide with the face of the female cone, E.

Fig. 1.



To the face of the cone, D, are attached radial knives, not shown in the drawings. To the face of the cone, E, are attached knives, G, which are arranged in groups, and are made with an angle or curve, as shown in Fig. 1, to prevent them from interlocking with the knives of the cone, D. In the face of the cone, E, between the groups of knives, G, are formed two concavities, H I. The concavity, H, leads up from the lower edge of the cone, E, to the front of the group of knives, to serve as a spout to conduct the pulp to said knives; and the concavity, I, leads from the rear of the group of knives, G, to the upper edge of the cone, E, to serve as a spout to conduct the pulp from the knives to the upper edge of the cone, E, so that it may pass freely back into the case or tank, A. To the lower edge of the cone, E, is attached the upper edge of a tube, J, which extends down nearly to the bottom of the case, A. With this construction, the centrifugal force engendered by the revolution of the cone, D, causes the pulp to pass up between the cones, D E, flow over the upper edge of the cone, E, and flow back into the tank, A, the pulp from the lower part of the said tank passing into the tube, J, and up between the cones, D E, so as to establish a circulation, and insure all the pulp being properly acted upon. This invention was patented through the Scientific American Patent Agency, April 17, 1877, by Mr. J. S. Warren, of Cumberland Mills, Westbrook, Me.

Fig. 2.



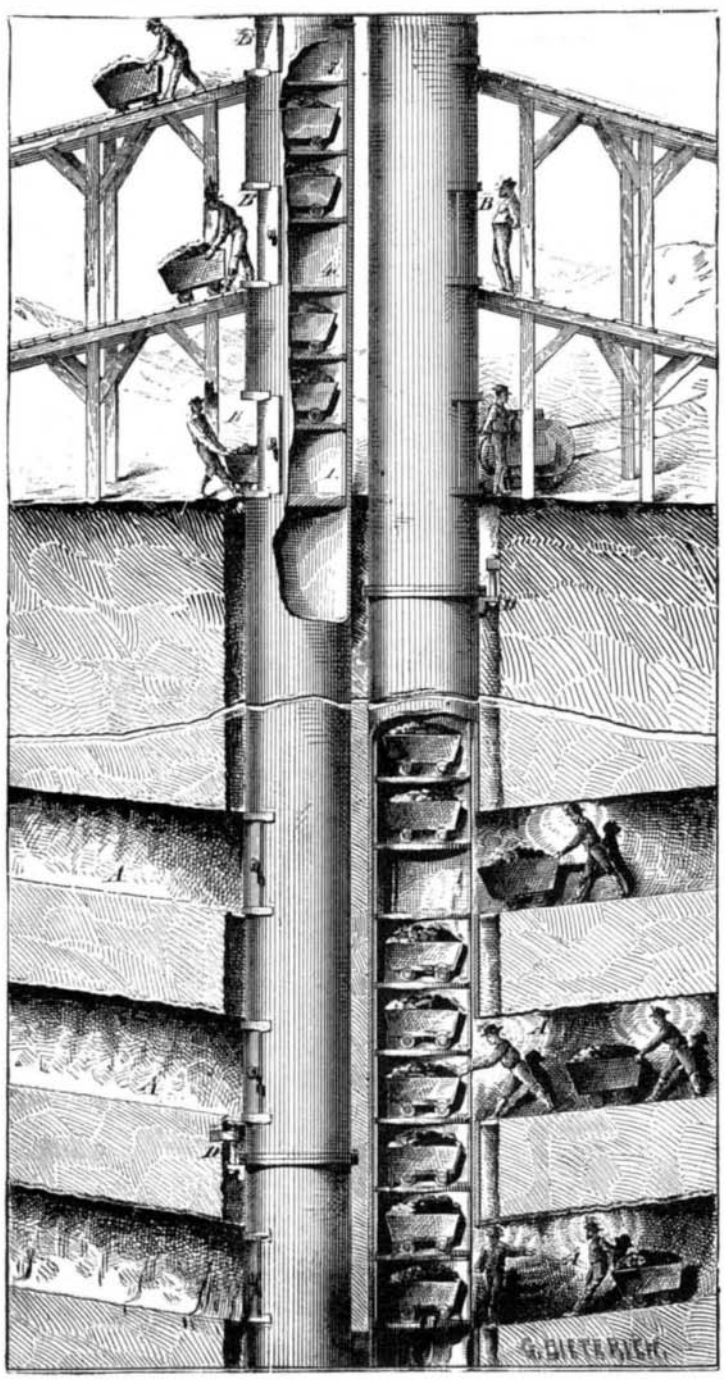
WARREN'S PAPER-PULP ENGINE.

PNEUMATIC ELEVATION IN MINES.

M. Blanchet has recently constructed, at Epinac, France, an atmospheric elevator which appears to be an important improvement in means of lifting the products of mines to the surface. The shaft of the mine is lined with an iron tube of about 1,920 feet in length, through which a load of 22,000 lbs. can be lifted. A vacuum is produced above the piston which supports the cage, which is thus carried up the tube by the normal atmospheric pressure acting from below. After the load is removed, the piston is allowed to descend slowly by its own gravity, sufficient air being admitted above it. Compressed air is not used to force the piston upward, on account of the heat necessarily developed by its compression being objectionable; and further, because pressure from within the tube tends to open any little fissures which may exist, while on the other hand pressure from without (which obtains when there is a vacuum within) serves to close them.

The charge to be elevated by M. Blanchet's apparatus is, as above stated, 22,000 lbs., and the piston has a diameter of 5·1 feet. The weight is therefore about 7·2 lbs. per square inch, so that but a partial vacuum is required above the piston. A manometer placed on the upper part of the tube indicates the condition of affairs within the shaft very clearly. In case the piston, in rising, encounters inequalities in the tube, so that its movement is stopped or delayed, the air pump, continuing its work, increases the vacuum, and allows a greater degree of atmospheric pressure to be exerted to push the piston past the obstacle. This change in the interior atmosphere is of course instantly shown by the manometer needle. The annexed engraving clearly exhibits the arrangement. At A are the various headings and galleries, which meet the shaft, and from which the filled receptacles are placed in the cage. At B are the openings above for removing the load. The doors at these upper apertures are kept closed during the ascension of the cage, and are not opened until the latter reaches the end of its upward journey. It will be observed that the cage contains nine tiers of receptacles, while there are only three receiving apertures above. The latter are, however, spaced apart a distance of about 10·5 feet, this being the height of three tiers of receptacles. Hence, after the cage has reached the summit, but three filled buckets or cars can be removed at a time, and three successive lowerings are necessary to bring the whole nine before the openings. The reception is accomplished as follows: The operator permits the cage to rise above the doors, and then closes the tube beneath them by a horizontal trap. The cage is thus prevented from falling, in case of any inopportune admission of air or accident to the machinery. Communication between the tube and the air pump is next closed, and a valve is opened, which allows air to enter very gradually above the cage. The latter then slowly descends. If the descent be too rapid, it is checked by closing the air valve or opening communication to the pump by means of a secondary small tube. By managing the two levers governing this apparatus, the cage is permitted to move down until tiers of buckets (Nos. 1, 4, and 7) are in front of the openings. Other levers are then manipulated, which cause wedges inside the tube to obstruct the further passage of the piston. In this way the cage is held motionless, so that no nice adjustment of difference of pressure need be looked to: although this is naturally so delicate that it is perfectly easy to stop and hold the cage anywhere in the tube without having recourse to the wedges. When the three filled receptacles above noted are removed, the operator withdraws the wedges, and permits the cage to sink until the second and then the third tier of receptacles comes in place. Then the trap is opened, and the cage without its load, now weighing some 11,000 lbs., is allowed to sink to the bottom of the tube. Just before it reaches this point, the air escape is cut off, so that the piston cushions on the slightly compressed air before it. The nine empty receptacles are then removed in the manner already described, three at a time.

M. Blanchet proposes soon to construct a second atmospheric tube, as shown in our illustration. The two cages will then travel in relatively opposite directions, and the work of the air pump will be diminished, the weight of one cage counterbalancing that of the other. The shaft is divided into two equal portions by a partition, one tube being in each compartment, while, in a third, an ordinary rope hoisting system may be arranged to serve as an auxiliary means of extraction. At D, in the illustration, is shown how the various sections of the tubes are connected. It will be noticed that the weight of the several portions is not borne by the parts directly underneath, else the weight of the immense column might cause its deflection. Each section is supported by eight rods, which are secured to horizontal timbers imbedded in the rocky sides of the shaft. Within the tube also are four longitudinal guides attached to its inner surface, which serve to prevent the rotation of the cage, so that the ore or coal receptacles are always brought in proper position before the doors.



BLANCHET'S PNEUMATIC ELEVATOR.

A New Resin--Kauri Gum.

We have recently met with a new vegetable product of peculiar origin and properties, the classification of which for some time was very puzzling until we made the acquaintance of a gentleman who was quite conversant with its appearance and sources. He at once pronounced it to be kauri gum, which is exported in some quantity from New Zealand. The physical properties of the gum were so different from those of most resins that we were led to try some experiments with it, which, though not entirely encouraging, may be here given to serve as a guide for those who choose to essay further trials of its usefulness from a photographic point of view. In appearance it is most like amber, which, also, in many other respects, it resembles. It is very similar to it in color, or one may say colors, for it is found in all the hues of amber, from the pale straw to light brown, and mingled also with cloudy-looking masses like clouded amber. It breaks with a lustrous fracture in the same manner as amber, but it is not so tough, and is consequently more fragile. Like amber, also, it is in a manner allied to fossil products; for, instead of being collected from growing trees, it is dug out of the ground on the site of old forests long laid low, and almost even with the ground—almost, but not quite, even; for to the little inequality on the surface of the broad, open ground, where the giant trees have fallen, does the gum hunter owe the power to find the hidden treasures of kauri gum. It is supposed that, possibly many centuries ago, conflagration of the *ti* tree scrub had destroyed the gum-bearing trees, which fell where they stood, half incrusted with the hardened sap, and according to their condition yielding small flakes or huge masses of sap, as the heated ground around them caused every particle of the resin to come to the surface. To find the gum, the heaps or mounds alluded to—which are covered with long grass and often scarcely discernible—are pierced by a steel-tipped spear which is carried for the purpose. A little practice soon enables the gum digger to discover if he has struck, not "ile," but gum. The experienced man then soon bares the spot, and finds pieces of the amber-looking material in blocks of various sizes, from a few ounces to half a hundredweight. This digging, which affords a means of livelihood to a large number of natives and colonists, known as "gum diggers," is also undertaken by the sheep breeder in his leisure moments, and to the small holder often, if luck favors him, forms a not unwelcome increase of income. It is collected and sent to market for shipment, and in England it appears to find purchasers who use it for the purpose of dressing calicoes with, for which object it is possibly dissolved by the aid of alkalies.