

Dredging at Waikaia.

(By A. Gordon Macdonald.)

A rather novel method of dredging is being carried on at Waikaia by the Mystery Flat G. D. Co., by means of which ground hitherto considered fit only for sluicing is being worked by the dredge.

After dredging all the available river flat, the dredge is now working its way up the gentle slopes of the terraces and foothills surrounding the river flats.

To do this, water has been brought on to the claim by means of a race some two or three miles long, and commanding ground at an elevation of about 50 feet above the river level. The dredge works in a paddock supplied by this race and continually stacks the tailings behind, forming a dam to keep up the level of the water in the paddock. As the ground is shallow a tailings elevator is not required, the dirt being washed through a sluice-box, as shown in the illustration.

It was found that the tailings dam would not rise with the rise of ground unless a low dam was first built up to hold the bulk of the tailings. Once started in

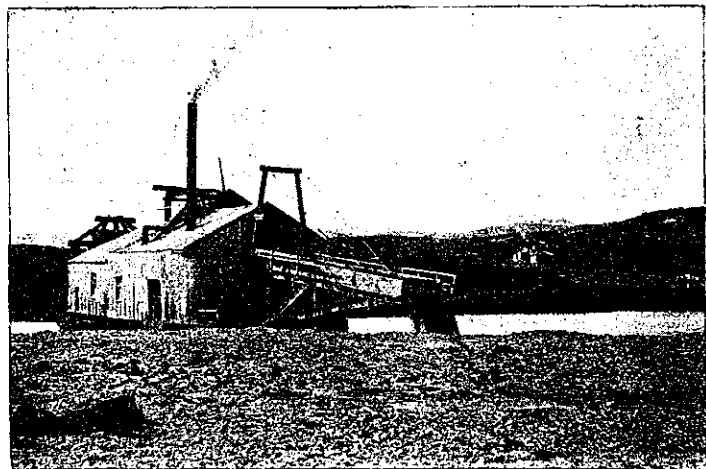
Aviation.

Ingenious Ornithopter Design

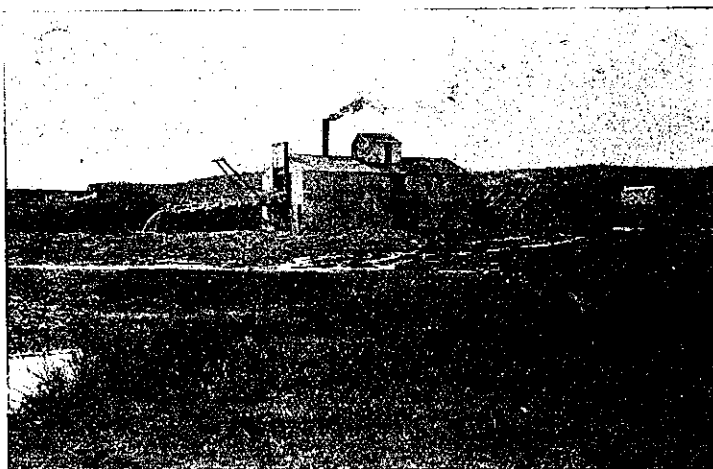
Professor H. La V. Twining, president of the Aero Club of California, and head of the department of physics and electrical engineering at the polytechnical High School, of Los Angeles, California, has completed an ornithopter in which he has embodied a knowledge of the principles of bird flight, gained during a close study of bird habits for twenty years.

The framework of this machine is made of bicycle tubing. It has a total weight of 100 pounds. The wings measure 27 feet from tip to tip. They are four feet wide near the body of the machine, being triangular in shape, narrowing to a point at the tip. They are operated by hand and foot levers. The levers connect by links to the front rib of the machine,

square feet; sweep of tip of wing, ten and one-half feet; hands moved through 13 inches; feet moved through sixteen inches. With hands and feet moved up the levers so as to get a leverage of two to one, a lift of 120 pounds was obtained on the down stroke, the machine at the same time rising two inches. On the up stroke of the wing the machine moved forward and showed a slight lift. Owing to the difficulty of suspending the machine from its centre of gravity the whole leverage, four to one, could not be tested. The Professor says in his machine the weight of the wings will be borne by springs, which will relieve the operator of having to bear their weight in handling the levers. The wings, when flapping, displace air and force it away at the rear tips and more air moves towards them at all other points, so that



The Masterton Dredge in the foreground, the Mystery Flat Dredge in the background, showing the track up which the latter dredge worked to gain its elevation. A. Gordon Macdonald, photo.



THE MYSTERY FLAT DREDGE, "WAIKAIA," which is dredging up-hill by depositing its tailings as a dam behind it. This photograph gives a view of the dam, which is seen to be fairly high. It is intended to dredge almost to the top of the low hills in the background. A. Gordon Macdonald, photo.

this manner the tailings keep building an efficient retaining wall for the paddock. These low dams of sods and brush will probably have to be built up occasionally as the dredge advances and rises.

At the present time the dredge is some thirty feet above the river level, and it is the intention of those in charge to work right up to the water race. After reaching that level pumping will be necessary to keep the paddock full, for the present intention is, if possible, to work over a low saddle at an elevation of about 50 feet above the level of the water race, and so into another gully, down which the dredge will work its way to the river again.

From the progress already made by the dredge, it would appear that this method of working is quite successful, and it may come about that ground so far considered unworkable, owing to the lack of water for sluicing, may yield profitable returns when worked by dredging in this manner. At all events, the immediate future of this dredge will be watched with interest by all associated with the progress and development of mining, and of dredging in particular.

within three inches of the main bearing, the hand levers being on the inner and the foot levers being on the outer side of the main bearing.

The bearings are ball throughout. The weight of the aviator is thus thrown upon the front edge of the wing both to raise and to lower it, the aviator at the same time being able to exert a pull between the hands and feet, the hands moving up while the feet move down to lower the wing. To raise the wing, the weight is thrown upon the hands, and at the same time the feet and the hands are made to approach one another by pulling up with the feet and pushing down with the hands. The levers give a mechanical advantage of two to one. By this means a pull of 250 pounds can be brought to bear upon the wings on both the up and down stroke.

Professor Twining states that he can beat the wings fifty-two times per minute, a beat being designated as one movement of the wing down or up. The machine was suspended from a spring balance, in recent experiments, and the following data was obtained: Weight, 240 pounds with operator; speed of stroke, fifty-two beats per minute; area of wing surface, fifty

pressure is developed under the wings. The up stroke of the wings in bird flight is very important, and has been ignored by those who have previously built bird-like machines, but he thoroughly believes that he will be able to use this force to excellent advantage. While the theory is correct, he believes that practice may develop unknown factors. In case of a failure in this instance, he intends to continue his experiments until he solves the problem.

Prof. H. L. Twining is at work on two machines of this type; the result is that he has continued his experiments and expects to soon build another. He is also engaged with Warren Eaton and F. S. Eaton, of Los Angeles, in the construction of a monoplane similar to the Bleriot. An important change in the control has been introduced since, instead of warping the wings or changing the angle of incidence of the fore and aft planes, auxiliary sliding planes are to be used. The sliding planes at the ends of the main planes, slip simultaneously to the right or left, thus decreasing the surface on one side and increasing it on the other. The tips of the rear planes slide in the same way, and the whole rear plane slides fore and aft, thus