33.—DIRECTIONS CONCERNING THE CONSTRUCTION OF CARP PONDS.

[Condensed from the report of the Maryland Fish Commission for 1880.]

The cultivation of carp is of sufficient importance to fully warrant the construction of ponds for the purpose. But there already exist in many places ponds used for the collection of ice, or for supplying water to live stock, which could be converted into carp ponds at a comparatively small cost. There are also many depressions of surface in the lands which could be filled with water with but little labor, and made to answer the purpose admirably.

It is very desirable, on several accounts, that the ponds should be so constructed as to permit the water to be drawn off. The fish can then be captured and assorted, when those intended for breeding can be returned to the pond and the remainder placed in tanks from which to be taken, by the aid of dip-nets, as required for market or for food. Drawing off the water is also desirable for destroying such enemies of the fish as may be therein.

In the case of ponds supplied by the inflow of tide-water, eggs of other fishes are often wafted in, and the fish thus produced may consume the food, eggs, and young of the carp. By draining the ponds once or twice a year these intruders can be readily removed.

To utilize an ice pond for carp is very simple. It is not necessary that the drainage from the surrounding fields should be diverted, except when excessive in quantity or liable to become so after a heavy fall of rain. A certain amount of such drainage often proves beneficial, as considerable quantities of food are thus conveyed into the ponds. If admitted, an "overflow" must be provided, which should be well protected by wire-cloth screens to prevent the escape of the fish. This overflow constitutes the most important feature in the construction of a pond.

For illustration, Fig. 1 is a pond located in a meadow, through which flows a small stream. The pond is formed upon two sides by embankments of earth obtained by the removal of a portion of the soil from the inclosed space. The water may be supplied either by introducing it from the rivulet itself at some higher point, or, as in this illustration, from a spring in the adjacent meadow, supplemented by the surface drainage from the surrounding high land. A small tributary of the rivulet is utilized in this instance to carry off the surplus water, which is allowed to escape from the pond through the overflow O. A is the apparatus for emptying the pond. B is a frame inclosing the end of the discharge pipe leading from the pond, and provided with the screens *s s s*. C is

the "collector," into which the fish are drawn by the lowering of the water in the pond, and *c* a valve which controls the flow of the water

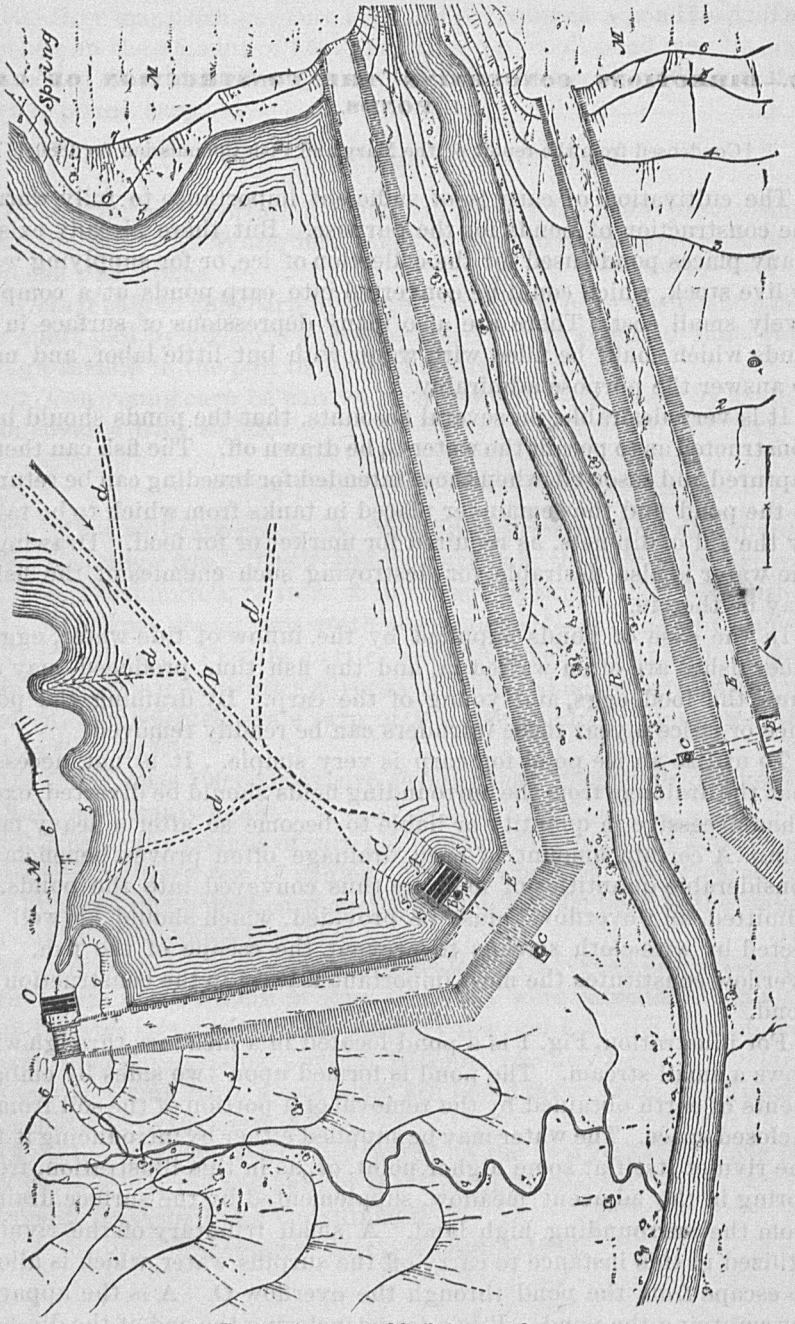

FIG. 1.—A carp pond built in a meadow.

through the discharge pipe *m*. D is a wide, shallow drain, having branches, *d d d d*, by means of which all of the water is led into the

collector when the pond is being emptied. E represents the embankments, which are about 6 feet in height at the angle of the pond in the lowest part of the meadow.

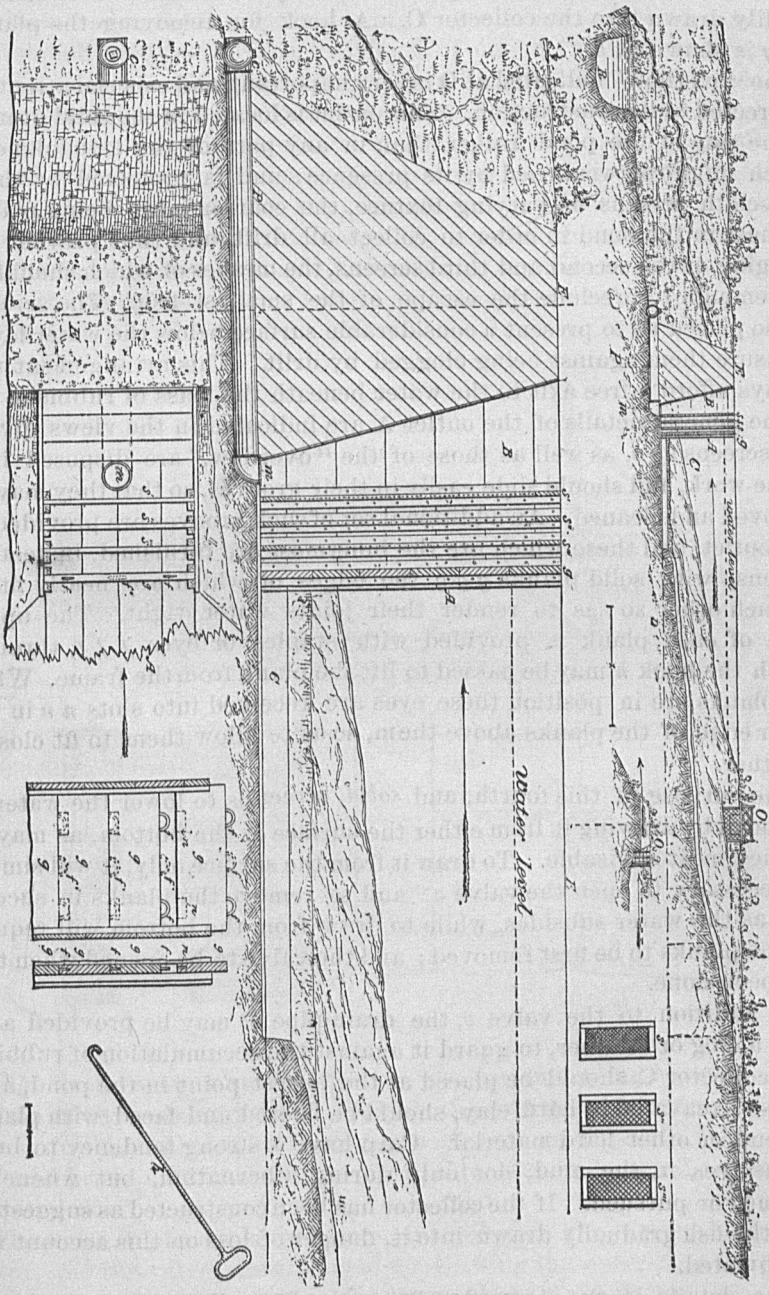

FIG. 2.—Sectional view of the dam of carp pond.

In Fig. 2 the upper portion presents a longitudinal section of the pond. The lower part shows a portion of the same section enlarged, so that the arrangement of the pond is clearly illustrated. The fish are readily drawn into the collector C. A hook for removing the planks *g g g* is shown at *h*.

The "overflow" indicated at O is very important, and especial attention is directed to its construction. This outlet is located in the solid ground at the side of the pond rather than in any part of the embankment, which might be weakened by its presence; and is protected by three wire-cloth screens of varying texture, the coarser mesh being placed farthest in the pond in order to collect all drift, and thus prevent the clogging of the second and third screens, the meshes of which should be fine enough to preclude the escape of the smallest fish. The screens are so placed as to present a considerable surface below the water-level, to insure them against being clogged by drift. This arrangement will always afford a free exit to the water beneath the mass of rubbish.

The general details of the outlet A are indicated in the views given. The screens *s s s*, as well as those of the "overflow," are disposed in a frame-work, and should slide easily in their grooves, so that they may be removed and cleaned. An additional set of such grooves are provided at this outlet, and these which are the innermost are furnished, instead of screens, with solid planks *g g g* the edges of which are neatly fitted to each other so as to render their joints water tight. The upper edge of each plank is provided with staples or eyes *f f f*, through which the hook *h* may be passed to lift the plank from the frame. When the planks are in position these eyes are received into slots *n n* in the lower edge of the planks above them, so as to allow them to fit closely together.

The purpose of this fourth, and *solid*, screen is to lower the water in the pond by drawing it from either the surface or the bottom, as may be deemed most advisable. To draw it from the surface only, it will simply be necessary to open the valve *c;* and to remove the planks in succession as the water subsides, while to draw from the bottom will require all the planks to be first removed; and the valve to be opened when this has been done.

In addition to the valve *c*, the drain-pipe P may be provided at *m* with a clog or strainer, to guard it against the accumulation of rubbish. The collector C should be placed at the lowest point in the pond, and, unless excavated in hard clay, should be floored and faced with plank, cement, or other hard material. Carp have a strong tendency to bury themselves in the mud, not only during hibernation, but whenever alarmed or pursued. If the collector has been constructed as suggested, and the fish gradually drawn into it, danger of loss on this account will be obviated.

The details of the "overflow," "outlet," "collector," &c., may be varied, according to the circumstances; but the general requirements

of a pond so located as to receive its supply of water at one end and to discharge it at the other are here indicated.

Ponds should not be less than three feet in depth at their deepest part—to insure the fish against being frozen in severely cold weather—and should gradually lessen to a depth of one or two inches to provide the shoals required for spawning. Small knolls and islands should be removed, as they generally afford harbor for the enemies of carp.

FOR PONDS IN TIDAL REGIONS.—The collector and drain ditches should be constructed and arranged as above, the collector being formed at the lowest point within the embankment. The "overflow" may be omitted, as the "flume" can be readily adapted to the purposes of carrying off any surplus water. As the flume requires constant attention to insure its operation, the "overflow" should be retained, if practicable, and be placed in firm ground.

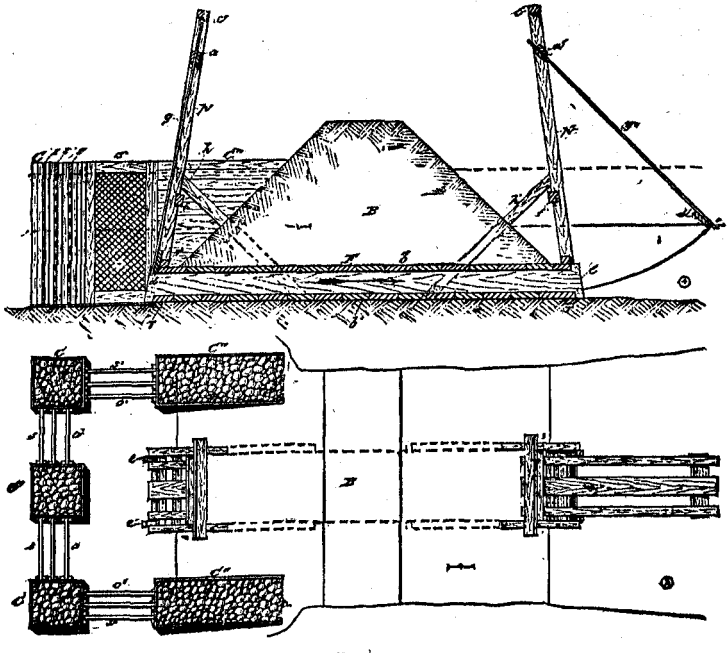

FIG. 3.

Fig. 3 represents a vertical section, and corresponding horizontal projection of the embankment B, showing the position of the flume F, and its controlling valves, *d d*, together with that of the crib-work "C C C," which is constructed on the pond side, and is designed to support the screens.

The flume is placed, as before, on a level with the bottom of the collector, and the valves are arranged for drawing the water *from* the pond, at ebb tide. The inner valve has been slightly raised by *sliding* upward its support *g* through the grooved trunnion *a*; and the pressure

of the water flowing through the flume, in the direction of the arrow, serves to *swing* open the outer valve, and to keep it open until the pond is emptied or the tide turns. In the latter event the outer valve closes

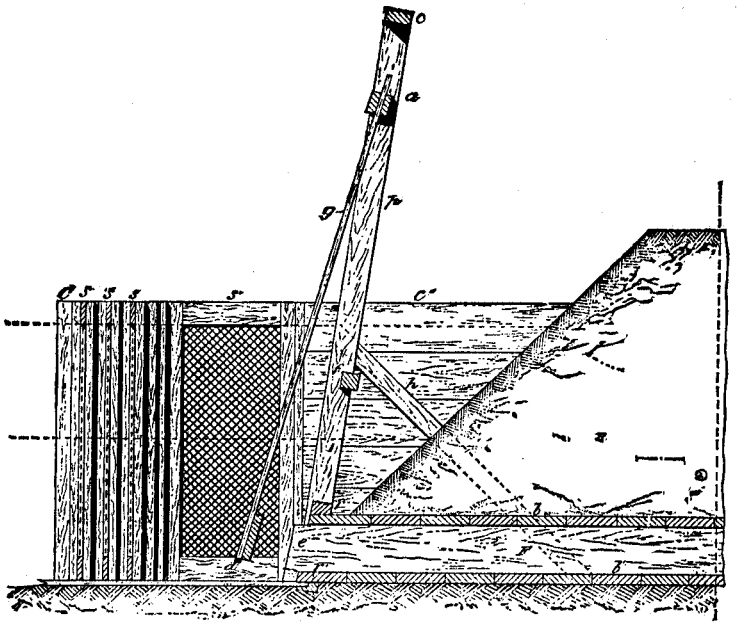

FIG. 4.

automatically until the level of the water without again falls below that of the water remaining in the pond when its operation is resumed.

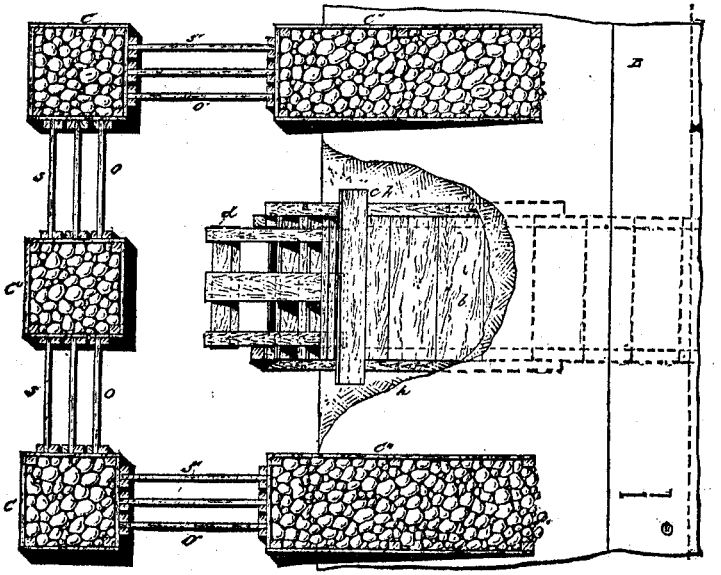

FIG. 5.

Should it be desired, on the other hand, to admit water from the river *into* the pond—at the proper levels—the relative positions and operations of the valves would, of course, be reversed. The outer valve should then be raised so as to allow the water to enter the flume from the river; and the inner valve should be lowered, in turn, to permit it to swing with the current, and to close automatically with the cessation of its flow.

Figs. 4, 5, 6, and 7 represent portions of the above considerably enlarged for the purposes of a more detailed description. The flap-valve *d*, which is here represented as being forced slightly open by the presence of the inflowing current, is attached to the lower extremities of the long strips or pieces *g g g*, arranged to slide upward through mortises in the beam *a*. The latter, in turn, is provided at each end with trun-

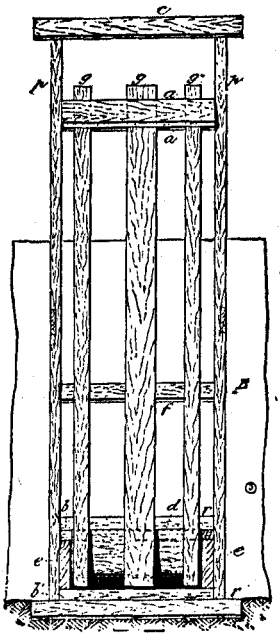

FIG. 6.

nions fitting loosely into corresponding sockets in the uprights *p p*, by which means the beam and its dependent parts are allowed to swing readily in place, as indicated by the positions of the gate or valve in the several diagrams.

Another and fixed beam, indicated at *f*, serves as an additional support to the uprights *p p*, and as the fulcrum of a lever by means of which the gate may be raised or lowered. "C C C" represent cribwork, filled with stones, and sustaining in position the screens *s s* and *o o*, which are arranged to slide in their respectitive grooves, similarly to those already described.

Fig. 7 is a flume or trunk of simpler design which may be constructed

by hollowing out one side of a stout log, for nearly its entire length, and covering the groove thus formed with pieces of thick plank. The bark should be allowed to remain undisturbed, where practicable, for a protection to the wood. The general arrangement of the flume and its valves is indicated in the diagram. As the valves do not work automatically, such a "plug-trunk"—as it is called—would appear to be better adapted for ponds located in other than tidal regions.

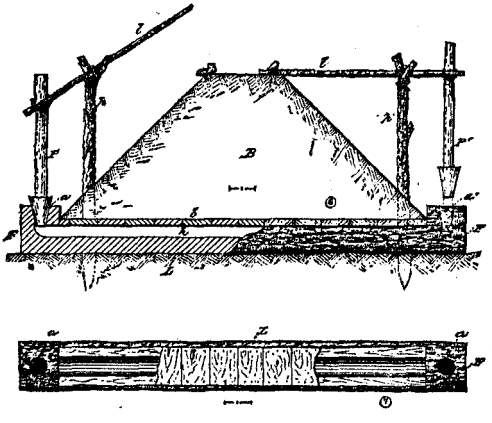

FIG. 7.

So much of the wood-work, in all these constructions, as is exposed to the air, and particularly such parts as are subject to the alternate action of the air and water, are liable to decay, and should be protected by thick coatings of paint, or other preservative material. Such parts as are imbedded in the earth will last for years.

34.—SPAWNING OF CALIFORNIA MOUNTAIN TROUT, REARED IN CONFINEMENT, FROM EGGS BROUGHT FROM McCLOUD RIVER.

By FRANK N. CLARK.

[From a letter to Prof. S. F. Baird.]

Our rainbow trout have just commenced spawning. The first eggs were taken day before yesterday, and we now have about 5,000. They are from three-year old fish that were hatched and grown at this station. There is a marked difference in appearance between these eggs and those of same kind direct from California, ours being identical in size and color with brook-trout eggs.

NORTHVILLE, MICH., *February* 15, 1883.