Mechanics of an "Efficient" Flycast

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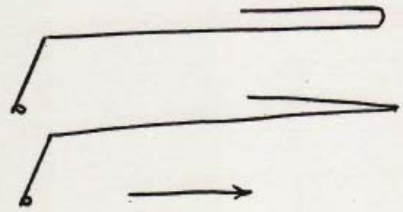
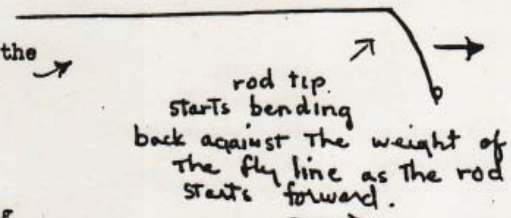
1. <u>The desired effect:</u> A fly line that forms a narrow, tipped over "U" or "V" shaped loop as it unrolls and straightens in the intended target direction.



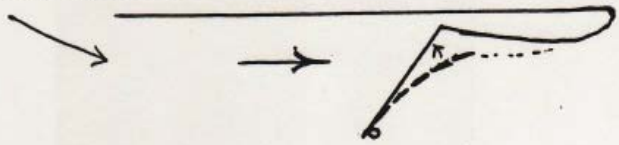
2. <u>Necessary conditions</u> to achieve this cast:

(1) The fly line is straightened behind the rod tip as the forward cast starts.



(2) The rod tip pulls the fly line along a straight path throughout its acceleration. This path corresponds to the intended target line of the forward cast.

(3) The rod tip is stopped as close beneath the moving portion of the fly line as possible.

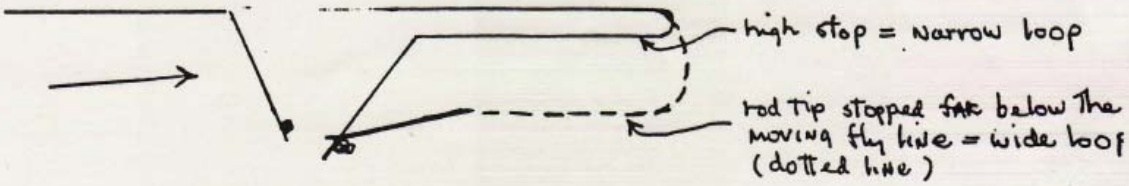


3. <u>Discussion:</u>

The weight to be cast, the fly line, provides resistance against the movement of the rod only when it has been straightened behind the intended direction of the cast. A loosely-coiled line provides no such resistance and even a line with some slack causes some wasted motion of the fly rod as it starts forward.

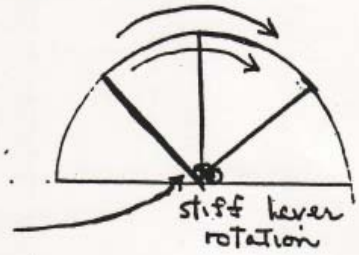
A flyline has no tendency to continue in a straight line but will follow blindly whenever the rod tip bends—as long as it continues to accelerate. Thus the fly line will follow a straight path toward the intended target line only if the path of the rod tip continues along that direction throughout its acceleration. If the rod tip pulls the line forward in a curving path, the line will follow that curving path forward

A controlled stop of the rod tip as close beneath the accelerating fly line as possible sets up an anchor point for the fly line that is close to the moving portion above it. This translates into a narrow loop.

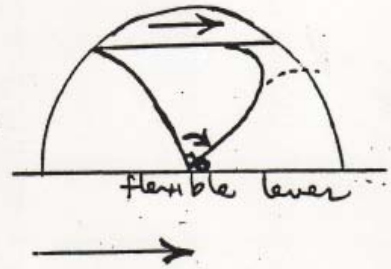


4. The "mechanics" of a rotating lever. The ability to cast a relatively weightless fly depends not only on the weight of the fly line but also on the mechanical advantages of using a long, light, flexible lever. The means of imparting velocity to the line with this lever might best be understood by analyzing the rotational movement of the spoke on a wheel.

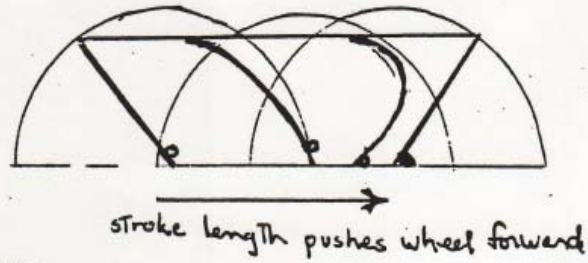
(1) The rotation of a stiff lever--a wheel's spoke
If we apply force to the pivot point or axle, the greatest speed is produced at the far end of the spoke (on the wheel's rim). We can increase the rim speed by applying more force at the pivot point.



(2) The rotation of a flexible lever. More speed is available with a flexible lever because the tip lags behind and then catches up quickly when the lever is stopped. The flexibility of the lever also allows the tip to take a short cut and even move forward along a flattened path. The shortening of the radius of this rotating lever also contributes speed. Ideally this lever is stopped as the tip reaches the end of the flat area.

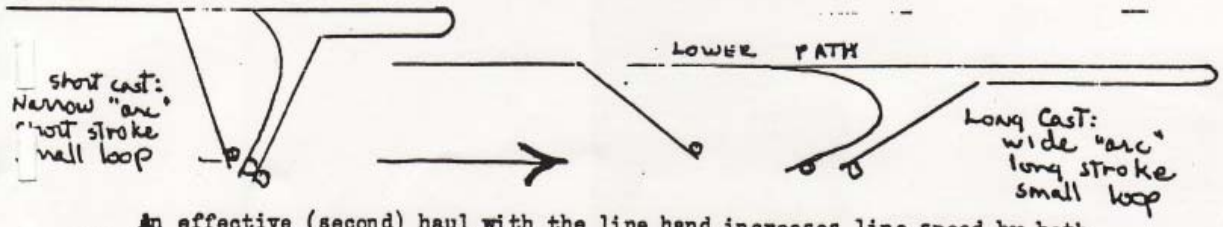


(3) Moving the whole wheel forward.
More speed yet is available if the wheel itself is moved forward by its axle as these other forces are occuring.



5. Additional mechanics for increased distance.

The additional force required to increase rod bend for a long cast could easily result in a "concave"path of the forward moving rod tip. This prospect is typically countered by widening the "casting arc" and/or lengthening the "casting stroke". The wider arc and more completely-bent rod result in a straight path that is lower (closer to the rod butt) than that used with a short cast.



An effective (second) haul with the line hand increases line speed by both (1) moving some line down through the rod during the cast and (2) increasing the rod bend and delaying the moment of "unloading" or spring of the rod tip. Thus line is moved directly by the haul and indirectly by increasing the speed of the rod tip as it turns over.