

cable so that as they came downstream they could hang onto it, and we rescued their personnel. We then kept on building and had our bridge finished far before they were able to resume and get theirs about a third through.

Perhaps young, less experienced leaders may, with imagination, excel and not be held down solely by the regulated procedures of more experienced personnel.

Engineer Inventiveness and Brigadier General Harley Ferguson—————

Q: Was it a distinctive characteristic of a lot of the engineers that you knew to be very inventive?

A: Not particularly. There were some who were, of course. But in the Corps of Engineers, most of your real technical experts in the various fields are in the Engineer Department civil service. The Corps of Engineers officers who were district engineers, division engineers, are-I'm generalizing, not talking specifics-are primarily engineer administrators and executives able to handle responsibility. In general, they have a technical background on all of this, but they're not immersed in the technical details.

Probably if they were immersed in the details of revetment, reinforced concrete design, or something connected with detailed design of a dam or generator, they'd be so engrossed in that particular phase that they wouldn't be qualified to handle the overall, such as dealing with contractors, dealing with specifications, supply problems, procurement problems, and coordination of it all. And so the district engineers and division engineers are mostly of an executive and administrative type-I mean if they're successful. You may find somebody like John Paul Dean, he was sort of a specialist in the field of hydraulics and flood control; and General Harley Ferguson, who was active on the Mississippi in connection with straightening out the channels through cutoffs.

Q: What about Harley Ferguson?

A: Ferguson. Harley Ferguson was sort of eccentric in that specific field. But by and large, I wouldn't say that Corps of Engineers officers were primarily inventive.

I might say, speaking of inventions, though, when I was on duty in the Chief's Office [1929-1933] I had Colonel [Edmund L.] Daley, and then later on I had Colonel John J. Kingman, as chief of the Rivers and Harbors Section, and I was their executive.

At that time we had these House Document 308 Surveys of all the rivers in the country; the Tennessee River, the Columbia River, and so on. It was a very active program. On the Tennessee, the Corps of Engineers were undertaking that development well before the TVA [Tennessee Valley Authority] took over. So we had plans for high-head dams, not just the low-head dams such as we had on the Ohio River primarily for navigation. But these large dams were joint projects for high-head development of power as well as navigation.

We needed to have navigation locks through them. Well, they had had some difficulty upon the St. Lawrence Waterway, where they had high-lift locks. At about that time somebody was drowned while he was in the little enclosed stairway area trying to transfer the lines where you secure the ship while it's in the lock. When the ship's in the lock, there are terrific surges of current both in the filling and also in the emptying, and they have to secure the vessel so it doesn't ram against the lock walls.

So Kingman said we were going to have a serious problem in the Tennessee Valley with the ships going through these high locks, and the problems they were having in securing the vessels. So I sort of said, "Well, I think I could work on it." So I sat down somewhere and after some cogitation, I thought about a floating mooring bit. At that time the mooring bits were fixed in the concrete walls at varying elevations and you had to transfer the lines as the ship went up and/or down during each lockage.

I devised a floating mooring bit mounted on a tank that would float up and down in recesses in the lock walls, with rollers or wheels for movement. These tanks would be recessed in the lock walls either with rollers or with wheels on a rail track. Then as you put the line on the bit, it would always remain at the same relative elevation as the ship. If the ship went down,

why of course the floating mooring bit would go down with it, and if it went on up, it, too, would rise, and that would solve it.

About that time the Engineer Department had had a problem with some civilian engineer in the department's employ who had decided to sue the government for royalties for developing some form of revetment. So Colonel Kingman said we ought to protect the government and get a patent on this, because otherwise somebody may come along and do likewise.

This was shortly before I had gotten my Freeman fellowship, and I was leaving for Europe. So anyway, I prepared all these sketches and with detailed descriptions and left for Germany. Well, within a month or two Colonel Kingman had had the legal department prepare an application for a patent, with the perfected detailed drawings, and the claims for a patent to be issued to John J. Kingman and Hugh J. Casey. So we're nominally joint inventors of that, but his only contribution to it, other than processing the patent application, was "we're going to have a problem" and I worked on and solved that. Then when I left, he had the legal department and the others process it. I noticed later on in the literature—I think it was after General Kingman had died—they talked about him as the inventor of the Kingman mooring bit.

But you were taking about whether people in the Corps of Engineers and its upper personnel are inventive. With occasional exceptions, usually back in the early years, they were not. Of course, in the early years the only technical school we had in this country was West Point, and the earliest engineers were graduates of West Point. They were active in the construction of the railroads, opening up our rivers, developing our ports, lighthouses, dams and waterways, and so on. They had to develop the civilian employees, who originally received their training from the district engineers, who were members of the Corps of Engineers. But nowadays, with the great production of all kinds of engineers and specialist engineers, and the availability of them to go into the civil service, that creates a great reservoir of well-qualified technical personnel.

Incidentally, though, speaking of inventiveness, you may be interested in what I thought would be a major contribution to our war effort. This was in '42, I believe, when I was the chief engineer of GHQ, SWPA, and of course busily engaged on the construction of airdromes, among our other activities. Our war operational runways were not like the usual commercial

ones with smooth wide concrete or macadam surfaces but had to be developed quickly of gravel, coral, landing mat. Our pilots, particularly in the early stages of the war, were not men of long years of flying experience, but generally comparatively young and far less experienced than commercial pilots. Our planes had high landing speeds.

In any case, I observed that on each flight landing, the tires were subjected to extremely high force in having to accelerate from zero to landing speed, also leaving streaks of rubber on the rough landing surface. The landings were further aggravated when it was not a perfect two- or three-point landing, due to the additional turning force resulting from a one-point landing tending to turn the plane during this vulnerable landing stage.

I figured that if the landing wheels were in rotation approaching landing speeds on landing, these adverse conditions could be avoided. I decided that if the tires were so cupped on their sides that when they were lowered for landing with the cups so mounted as to have their concave portion facing forward on the under side of each wheel and thereby having the convex sides facing forward on the top side, the strong wind forces acting on the wheels when lowered would gradually rotate the wheels to approach landing speed. I also indicated that alternatively and preferably similar cup arrangements could be mounted or built in the spoke sections of each landing wheel so that when the wheels were lowered prior to landing they would be accelerated by the wind to landing speeds.

I then prepared sketches of such devices and forwarded them through channels to the Chief of the Air Forces in Washington. About a month or two later I received a return endorsement turning down this suggestion on the grounds that "the Chief of Air Force had determined not to add other extraneous devices that would add to the weight of the plane." I still have that communication somewhere in my old war files. I still feel that many tires would have been saved or their lives prolonged and certain landing accidents avoided had my suggestions been adopted.