calls for, or as the light already obtained promises. We did not think it desirable at the commencement of our labors, while the manufacturers of both flax and cotton as well as ourselves were in a comparatively undeveloped state, to use the appropriation in crude experiments, or expenditures that might result only in loss. We preferred, as far as possible, to avail ourselves of the incipient efforts of those whom patriotism or hope of securing monopolies had stimulated to attempt the solution of the cottonizing problem. To this end, two of our commission visited in the past autumn nearly all the points in the western and eastern portion of the country, and in the Canadas, where particular attention had been given either to the growth or manufacture of flax. From these visitations and conferences, to which have since been added our own experiments, we have reached conclusions both in regard to the most promising modes of using flax cotton prepared exclusively by mechanical means for the manufacture of coarse goods, and by combined mechanical and chemical means for the manufacture of fine goods on cotton machinery, which we will now proceed to delineate, premising that if the unexpended balance of the appropriation is devoted to further discoveries by this or a new commission, the results might be given in a supplementary report at the first session of the next Congress. We think this course preferable to a lapse by "non-user" of the unexpended part, and much more likely to result in a larger contribution of valuable knowledge to the public upon this highly national investigation than a distribution of it in small sums to the many enterprising parties in different sections of the country who have so courteously responded to our call for information, and who have so generously sent specimens of their various productions for the museum of the Department.

"Very good short flax stock is prepared from tangled straw for coarse yarn mills by Randall's, Clemens's, Smith's, and several other series of machines, but the cleanest and finest short stock that has come under our notice is that obtained from the Davies machine, made at Dayton, Ohio. This machine is composed of an iron or wooden frame, having a series of five open aprons, fluted feed rolls that rotate in iron shells, and wooden cylinders which have diameters of a foot each, and revolve about six hundred times per minute. The surface of the cylinders is perforated for the reception of square spring-tempered No. 12 wires, square at the ends, and inserted in the apertures in spiral rows converging from the heads towards the centres, and projecting from the surface about half an inch. The flax either in the straw (if retted) or in the form of crude tow is fed on a level apron through the feed rolls to the first cylinders, from which it is thrown on an inclined apron to be carried to the second set of feed rolls and the second cylinder, and then successively over the other inclined aprons, and through the other feed rolls, and over the other cylinders, until delivered at the end of the machine in bulk, when it is collected and baled in the same manner as cotton for the market.

"In this form it is carried into cotton mills and presented first to the lapper, no preliminary operations being required, as it is to a great extent free from shives, dirt, or other extraneous matter. But as this stock, notwithstanding its comparative cleanliness and the ease with which it is made into laps, is too coarse and uneven for the carding process, without modifying the lapper beaters to adapt them for shortening the long filaments and fibres and making all the fibres finer, we added to each of the beaters another set of arms, and attached at the ends in lieu of knives wooden lags two and a half inches wide. The fronts of these were covered with strips of leather two inches wide, into which were inserted curved and pointed teeth of No. 14 wire, with their points on the same periphery as the knives on the other arms, and which, when in motion, rotate within about one-eighth of an inch of the periphery of the feed rolls. The speed of the beaters, arranged in this manner, should be about 2,000 revolutions per minute. When the beaters are so equipped, they not only distribute the grist evenly on the wire cylinders and lap rollers, but if the laps are doubled and carried through the lapper a second time, they disintegrate the filaments so thoroughly as to largely increase their number, and at the same time materially shorten those that were of too great length for the subsequent operations in the mill, without visibly shortening those that were sufficiently short in the bale. The laps so prepared are next carried to the carding machines, the carding power of which, in a great number of American mills, is in a main cylinder, doffer, and top-flats, all covered with fine, chisel-pointed wire clothing, which, although well adapted for carding cotton, is considered insufficient for carding flax fibre. The insufficiency is caused by the fact that flax fibres have less elasticity and greater specific gravity than cotton, and are withal straight rather than curled like the latter, and hence do not rest easily upon the surface of the teeth, but are inclined to imbed themselves among the teeth, which makes it desirable to substitute