E. PIGNONE.

FOLDING MACHINE.

APPLICATION FILED JUNE 8, 1916.

Patented Jan. 30, 1917.

3 SHEETS—SHEET 1.

1,213,900.

Fig. 1.

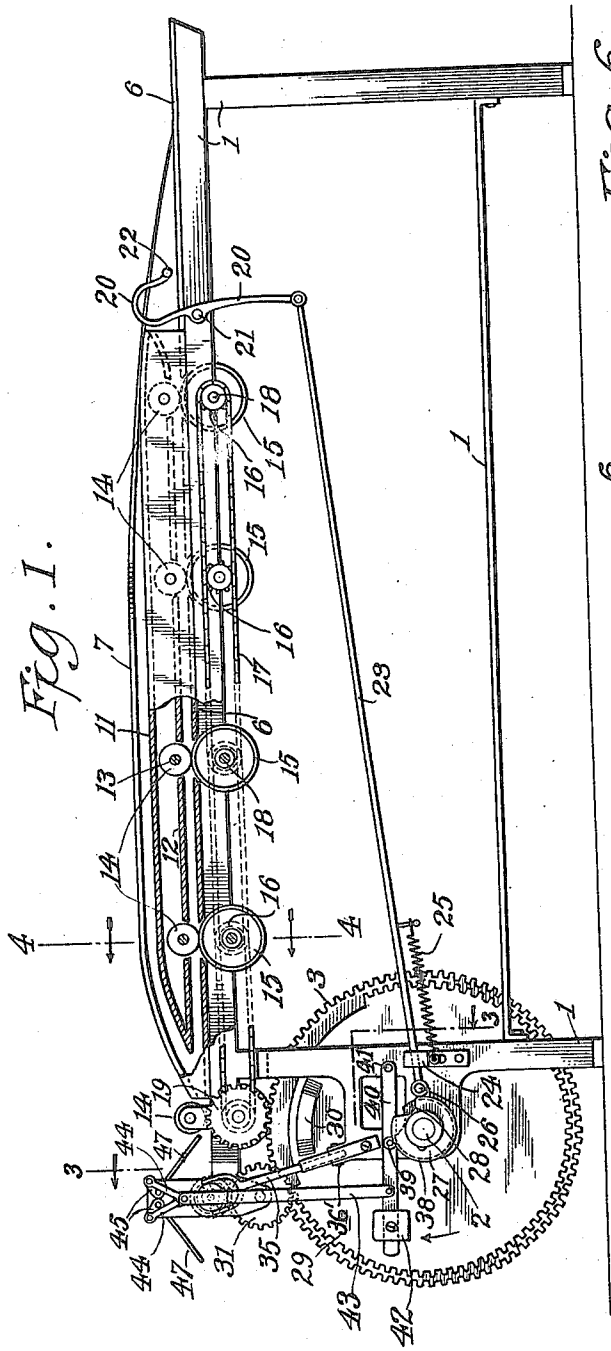


Fig. 6.

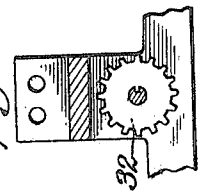


Fig. 5.

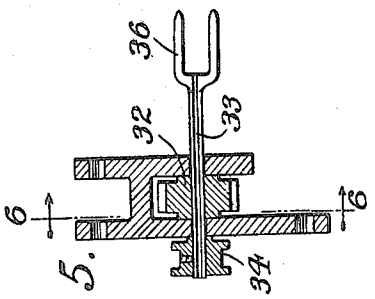
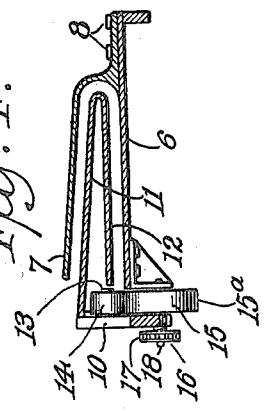


Fig. 4.



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3 SHEETS—SHEET 2.

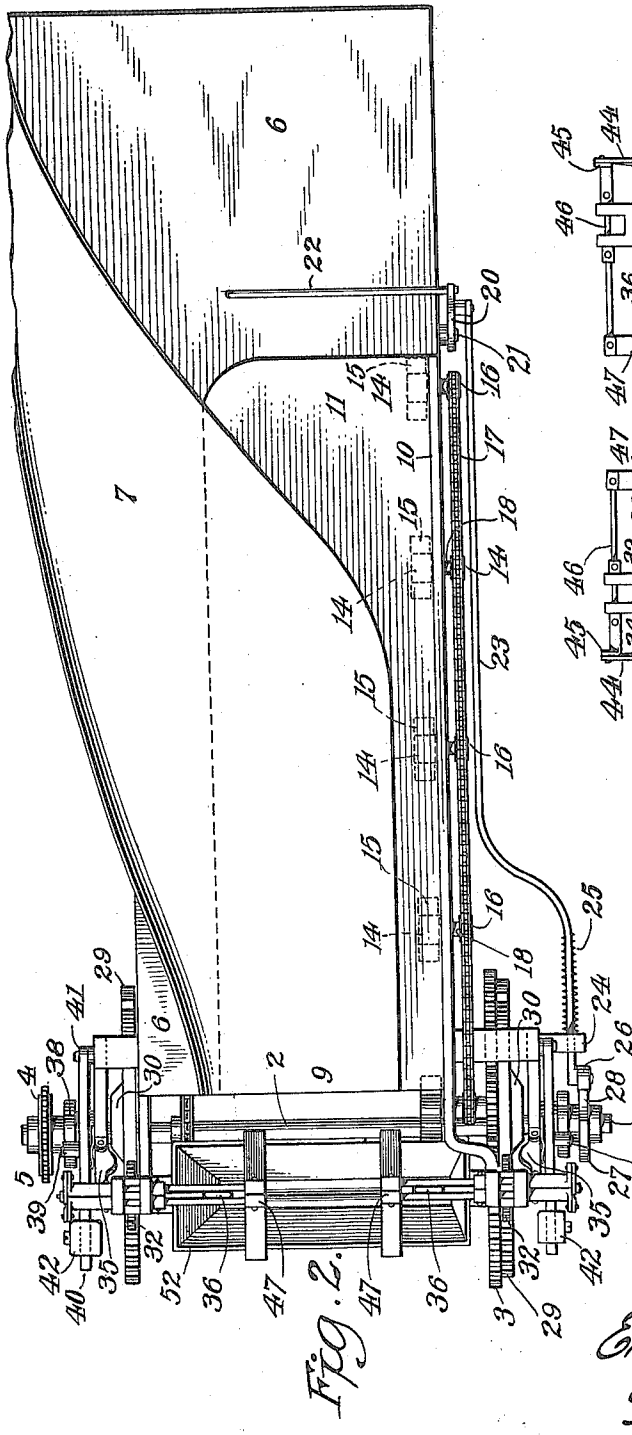


Fig. 2.

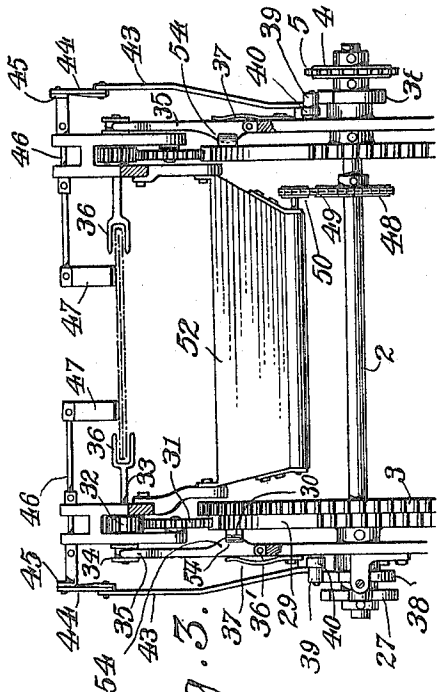


Fig. 3.

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3 SHEETS—SHEET 3.

Fig. 11.

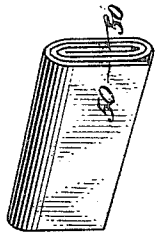


Fig. 10.

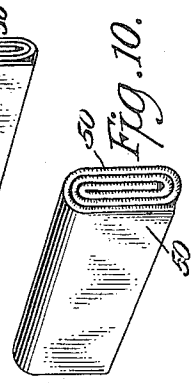


Fig. 9.

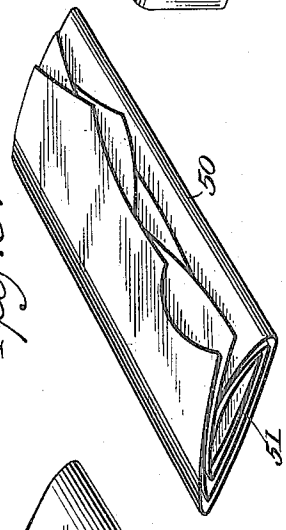


Fig. 8.

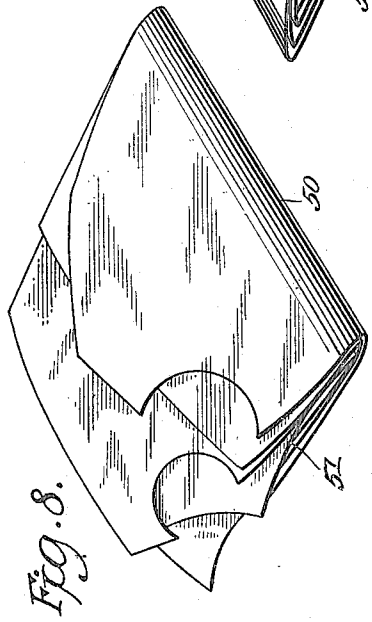
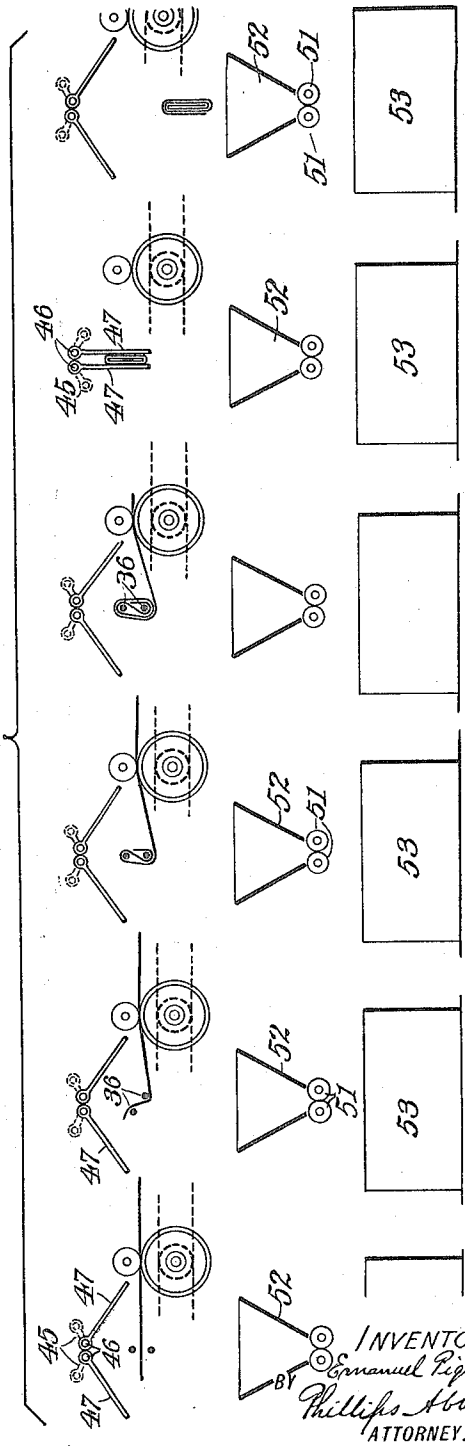


Fig. 7.



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UNITED STATES PATENT OFFICE.

EMANUEL PIGNONE, OF NEW YORK, N. Y.

FOLDING-MACHINE.

1,213,900. Specification of Letters Patent. Patented Jan. 30, 1917.

Application filed June 8, 1916. Serial No. 102,414.

To all whom it may concern:

Be it known that I, EMANUEL PIGNONE, a subject of the Kingdom of Italy, and a resident of the borough and county of Bronx, city and State of New York, have invented a certain new and useful Folding-Machine especially designed for folding paper dress-patterns or other paper or textile articles preparatory to inclosing them in a suitable wrapper for transportation and presentation upon the market, of which the following is a specification.

In the manufacture of the articles in question much time is consumed in gathering together the various pieces constituting a complete pattern or similar article and in folding them in such manner that they may be readily inserted in their envelops or wrappers and that none of the parts be torn or defaced, and since this work is usually done by unskilled operatives, it is a further purpose of my invention to so construct the machine that it shall be automatic in all its operations, so that the material being properly fed to one end of the machine will be delivered at the other end in proper condition to be immediately placed in its envelop or other wrapper.

Referring to the drawings, Figure 1 is a longitudinal elevation, partly in section, of a machine embodying my invention; Fig. 2 is a plan view of the machine shown in Fig. 1; Fig. 3 is an elevation, partly in section, taken on the line 3—3 of Fig. 1 and looking in the direction of the arrows; Fig. 4 is a cross sectional view, partly in elevation, taken on the line 4—4 of Fig. 1 and looking in the direction of the arrows; Fig. 5 is a sectional view, partly in elevation, showing in detail the construction of one of the "rolling forks"; Fig. 6 is an elevation, partly in section, of the parts shown in Fig. 5, taken on the line 6—6 of Fig. 5 and looking in the direction of the arrow; Fig. 7 is a series of views showing the operation of the rolling forks and compressing fingers and the relation of these parts to the underlying hoppers, final squeezing rolls and underlying receptacles; Fig. 8 is a perspective view of a dress pattern folded so as to present one straight edge for the proper guidance of the pattern through the machine for additional folding; Fig. 9 is a perspective view of the dress pattern shown in Fig. 8, which has been additionally folded; Fig. 10 is a perspective view of the dress pattern shown in Figs. 8 and 9 after the rolling or coiling action has been performed by the rolling forks and before the final compressing; Fig. 11 is a perspective view of the dress pattern shown in Fig. 10 after the compressing action by the squeezing fingers and compressing rollers and as delivered from the machine ready for insertion in its appropriate wrapper.

In the drawings 1 represents a suitable frame for the support of the apparatus, 2 a main shaft upon which is a main driving wheel 3. The power, whatever its special form, may be conveyed to the machine by means of the sprocket wheel 4 and sprocket chain 5, or in any other preferred manner.

Mounted upon the frame 1 is a support, or table, 6, which may beneficially be made of metal and upon one side is mounted a gradually narrowing deflector or primary folder 7, by means of bolts 8, or in any other suitable manner. As shown, the deflector is so formed that it contracts the flat surface of the support or table so that at the delivery or throat end 9 (see Fig. 2) it and also the table are of the desired widths to effect the operations to be performed by the machine.

Upon the side of the table opposite to that upon which the deflector is mounted, is a vertically arranged guide plate attached to the upper edge of which is what I call an interior guide plate or folder 11, preferably, but not necessarily of the same width throughout, the forward end of which should be of less width than that of the interior of the deflector at the end 9. This plate 11 projects laterally between the deflector 7 and the table or support 6, and preferably has a return member 12, which lies parallel to and a suitable distance from the table (see Fig. 4) so as to secure smooth action in the folding operations.

Upon a series of studs 13 (see Fig. 4) rotate a series of rollers 14, and beneath them co-acting rollers 15, which latter are driven by sprocket wheels 16 and sprocket chain 17. The wheels 16 are fast upon shafts 18 journaled on the frame upon which the rollers 15 are supported. I prefer to cover the face of the rollers 15 with a rubber or similar yielding substance, 15^a, adapted to radial compression to accommodate different thicknesses in the material being folded and also to more positively assure the feeding thereof through the machine. The lower and up-

per arcs respectively of the rollers 14 and 15 are in substantially the same horizontal plane as the upper surface of the table or support 6. The sprocket chain 17 is actuated by a sprocket gear 19 (see Fig. 1) which is driven from the main driving wheel 3.

20 is a combined guide and guard pivoted at 21 to the side of the machine and having a cross bar 22, which extends transversely of the table.

23 is a cam rod pivoted to the lower end of the combined guide and guard 20. It is supported at the forward end of the machine upon a bracket 24 and is provided with a retractile spring 25. Upon the end of the cam rod 23 is a roller 26 which engages with a cam wheel 27 on the main driving shaft 2. This cam wheel has a cut out 28, and the arrangement is such that when the roller 26 comes in contact with the cut out, the retractile spring 25 will draw the rod 23 backwardly and cause the bar 22 of the combined guide and guard to be brought down into somewhat close contact with the surface of the table, so as to act as a guide to the operative when to feed the patterns to the machine so as to prevent the feeding of succeeding patterns so rapidly that they might ride up on one another and thus cause confusion in the work.

Upon each side of the machine are the following parts: 29 is a broken gear mounted on the main shaft 2 and adjacent to the part where the cogs are omitted there is a laterally projecting cam surface 30. A pinion 31 engages with the broken gear and in turn meshes into a pinion 32, which is splined to a sliding spindle 33, which has upon its outer end a grooved wheel 34 within which works a bifurcated lever 35, which is pivoted at 36' and provided with an actuating spring 37. Upon the inner end of each spindle is a fork 36 adapted to embrace the edges of the partly folded dress patterns as they are presented to them by the other parts of the machine. The cam surfaces 30 on the side of each broken gear 29 engage against a projection or similar surface 54 made on each lever 35. It will be noted that the construction is such that when the cam surfaces 30 engage the projections 54 of the levers, they will be forced outwardly, so as to release the dress pattern previously engaged by the forks and that the springs 37, after the cam surfaces 30 have passed, will again cause the levers 35 to move inwardly, carrying the forks with them.

Upon the main shaft 2 there are mounted two cam wheels 38, 38, one at each side of the machine, with each of which engages a roller 39, which is supported upon a bar 40. The bars are pivoted at 41 to the main frame and at their outer ends is a weight 42. Projecting upwardly from and pivoted to the bars are vertically arranged pitmen 43, one on each side of the machine, to the upper ends of which are pivoted a pair of links 44, 44, which engage with cranks 45, 45, which are supported upon shafts 46, and upon each of these shafts is what I call a squeezing plate 47. The construction and arrangement of this part of the apparatus are such that when the rollers 39 encounter the cut out portion of the cam wheels 38, the weights 42 will cause the pitmen 43 to move downwardly, and they in turn acting through the links 44 and cranks 45 will cause the squeezing plates 47 to move toward one another, as illustrated in Fig. 7, thus squeezing the folded dress pattern, or equivalent material, between them, compacting and smoothing it, and as soon as the rollers 39 move out from the depression in the cam wheels 38, then the pitmen will be again lifted and the squeezing plates will be again separated, releasing the folded and now squeezed patterns, as also illustrated in Fig. 7.

Upon the main shaft 2 (see Fig. 3) there is a sprocket wheel 48, having a sprocket chain 49, which engages another sprocket wheel 50 fast upon the shaft of one of the rollers 51, which are suitably journaled at the bottom of a hopper 52 in which the folded and squeezed patterns are automatically dropped by the machine, and as they pass through between the rollers 51, they are given a final compressing squeeze, after which they are dropped into the receptacle 53, from which they are removed by the operator and placed in their appropriate wrappers or envelops.

The operation is as follows: The material to be folded, whether it be a dress pattern or other article, is laid upon the table or support in such manner that a straight, or substantially straight edge 50, see Fig. 8, may be fed to the guide plate 10 at one side thereof. Thereupon, at such time as the combined guard and guide is elevated, the operator shoves the material forwardly until its forward edge or edges 51 is gripped between the first pair of rollers 14 and 15, by which it is then carried forward, in so doing passing between the return member 12 of the interior folder or guide plate 11 and the upper surface of the table 6, and as it passes still farther forward, being fed by the succeeding pairs of feed rollers, the deflector 7 folds over inwardly the outer edge of the material opposite to that presented to the guide plate 10 and at the end 9 of the table and deflector, these folded parts come together and are superposed upon one another, substantially as shown in Fig. 9, so that when they pass between the most forward pair of the rollers 14 and 15, they receive a partial or primary squeezing action.

From these rollers the material passes still forwardly until it reaches the rolling forks 36 and the machine is so timed that when the material will have attained the desired position, the forks 36 will be retracted or spread apart and immediately thereafter they will move inwardly, their position being such that the edges of the partly folded material will pass between the tines of the fork. Immediately thereafter, through the operation of the parts described, the forks simultaneously and co-extensively rotate, so as to roll or coil the partly folded material upon itself into the form substantially as shown in Fig. 10. The several positions of the rolling forks and of the material during this operation are shown in the series of sketches constituting Fig. 7. When the rolling operation has been completed, and this of course will depend upon the detail of construction of the particular machine, because the forks may be made to rotate as many or as few times as the work to be performed requires, then through the operation of the squeezing plates and the mechanism which actuates them, they swing downwardly, firmly compressing or squeezing the folded and rolled material between them and when held by these squeezing fingers the rolling forks are withdrawn to the right and left, so that when immediately thereafter the squeezing fingers are in turn opened, the material in substantially the form shown in Fig. 11 will drop into the underlying hopper 52 and pass between the rollers 51 at its bottom, where the material will receive its final compacting compression. From these rollers it drops into the receptacle 53, or upon any other preferred delivery device from which it will be taken for convenient inclosure within its envelop or other wrapper.

It will be noted that all the operations are automatically performed by the machine and there is no occasion for an operative, however careless or unskilled, to put his hands or fingers anywhere within the working parts, and so true is this that the entire machine may be covered with a metal or cloth hood, if desired. All that is necessary is to present a straight, or substantially straight edge to the machine at the feeding end as described and the guard and guide located at that end will preclude the possibility of any accident happening to the operative so feeding the machine.

It will be obvious to those who are familiar with such matters that the machine illustrated and described herein constitutes one form only of many in which my invention may be embodied. Indeed, all the devices may be more or less, some entirely changed in detail of construction and still their operation and consequently the invention retained. I therefore do not limit myself to the details shown and described.

I claim:

1. In a folding machine, a horizontal support for the material, a straight guide plate projecting vertically at one side of the support, a deflector gradually narrowing in the direction of feed of the material overhanging the support and located opposite the guide plate, a horizontally disposed guide plate between the support and the deflector but separated from both, a guide to determine the feed of the material to the machine, feeding devices located in the same plane as the support adjacent to the vertical guide plate, rolling devices beyond the feeding devices adapted to engage the material and coil it and squeezing devices adapted to flatten and compress the coiled material.

2. In a folding machine, a horizontal support for the material, a straight guide plate projecting vertically at one side of the support, a deflector gradually narrowing in the direction of feed of the material overhanging the support and located opposite the guide plate, a horizontally disposed guide plate supported from the vertical guide plate and located between the support and the deflector but separated from both, a guide to determine the feed of the material to the machine, feeding devices located adjacent to the vertical guide plate only and arranged in pairs, the meeting surfaces of which are in the same plane as the support, rolling devices beyond the feeding devices adapted to engage the material and coil it, and squeezing devices superimposed above the coiling devices adapted to grip the coiled material and flatten and compress it.

3. In a folding machine, a horizontal support for the material, a straight guide plate projecting vertically at one side of the support, a deflector gradually narrowing in the direction of feed of the material overhanging the support and located opposite the guide plate, a horizontally disposed guide plate supported from the vertical guide plate and located between the support and the deflector, but separated from both, a guide to determine the feed of the material to the machine, feeding devices located adjacent to the vertical guide plate only and arranged in pairs, the meeting surfaces of which are in the same plane as the support, rolling devices beyond the feeding devices adapted to engage the material and coil it, squeezing devices superimposed above the rolling devices adapted to grip the coiled material and flatten and compress it, a hopper to receive the flattened and compressed material, and squeezing rollers in the bottom of the hopper.

4. In a folding machine, a horizontal support for the material, a straight guide plate projecting vertically at one side of

the support, a deflector gradually narrowing in the direction of feed of the material overhanging the support and located opposite the guide plate, a horizontally disposed guide plate between the support and the deflector but separated from both, feeding devices located adjacent to the vertical guide plate only and in the same plane as the support, endwise movable rolling devices beyond the feeding devices adapted to engage the material and coil it, and squeezing devices adapted to grip the coiled material and hold it during the withdrawal of the rolling devices and to flatten and compress the coiled material.

In testimony whereof I have signed my name to this specification.

EMANUEL PIGNONE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."