June 4, 1968 D. RAZZOLINI 3,386,196

SHEET BLANKS FOR CONSTRUCTION OF THREE-DIMENSIONAL REPRESENTATIONS OF BIRD SPECIES

Filed July 22, 1966 4 Sheets-Sheet 1

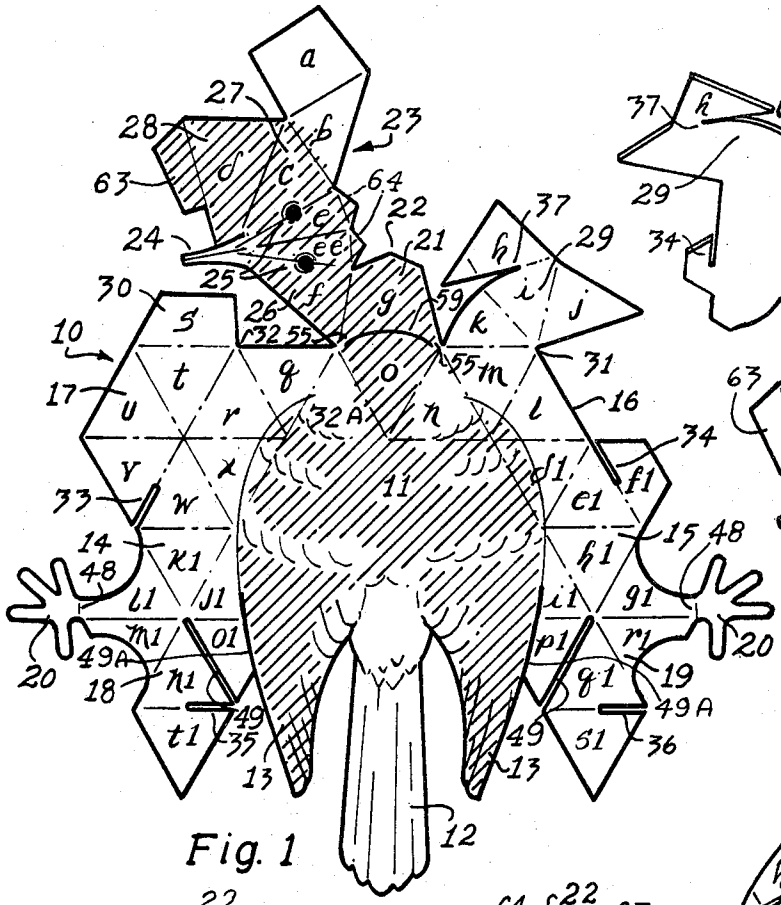


Fig. 1

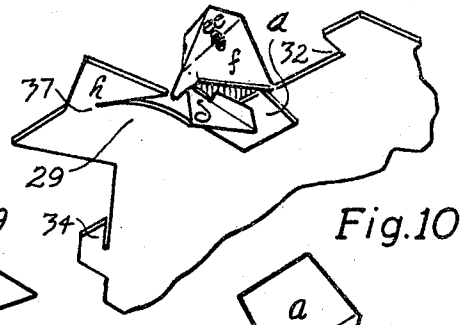


Fig. 10

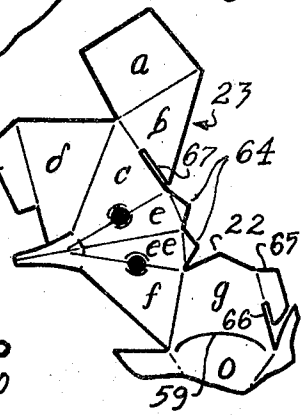


Fig. 13

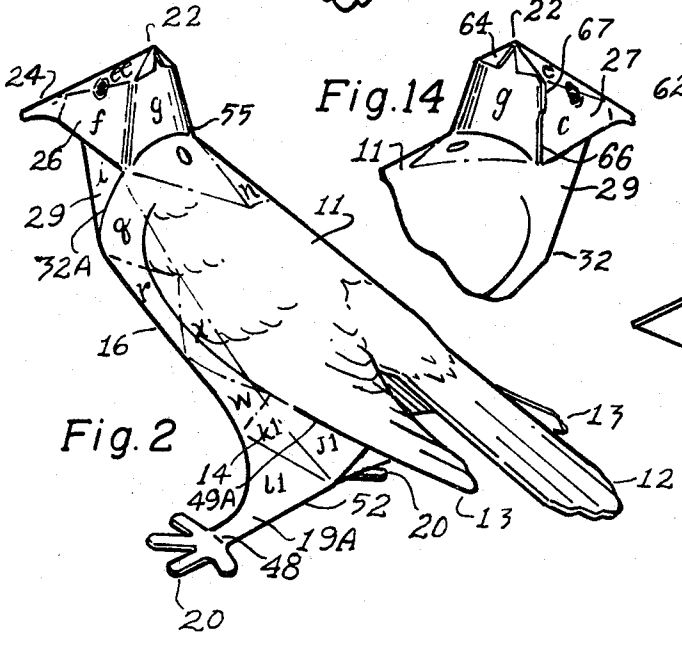


Fig. 2

Fig. 14

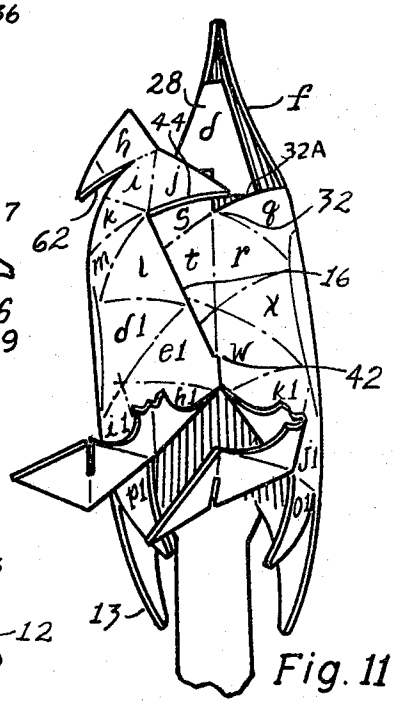


Fig. 11

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June 4, 1968 D. RAZZOLINI 3,386,196

SHEET BLANKS FOR CONSTRUCTION OF THREE-DIMENSIONAL REPRESENTATIONS OF BIRD SPECIES

Filed July 22, 1966 4 Sheets-Sheet 2

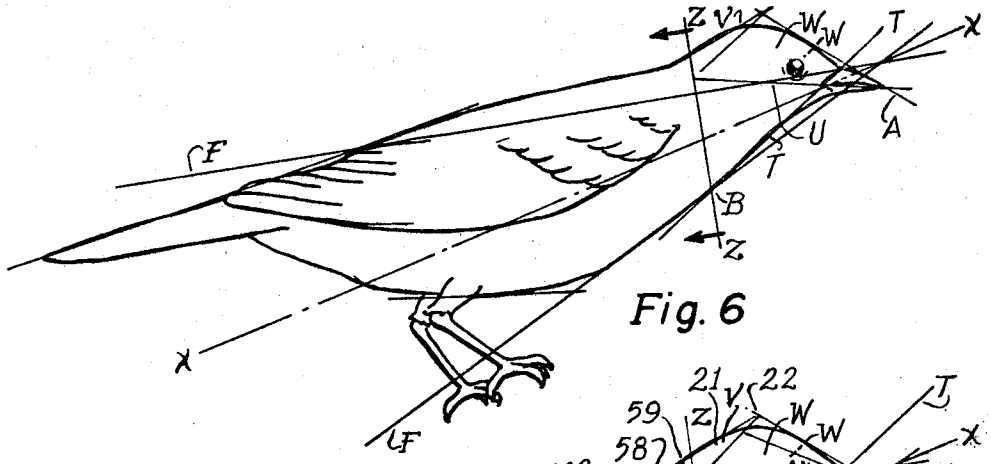


Fig. 6

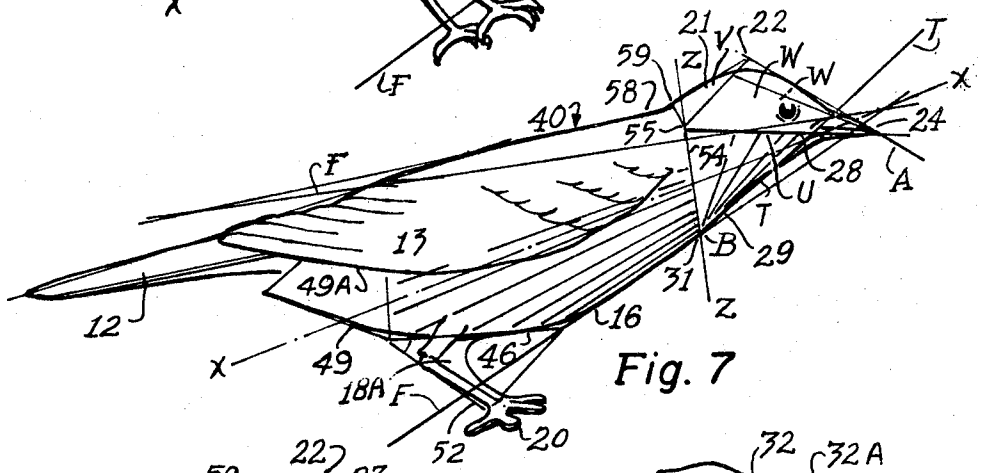


Fig. 7

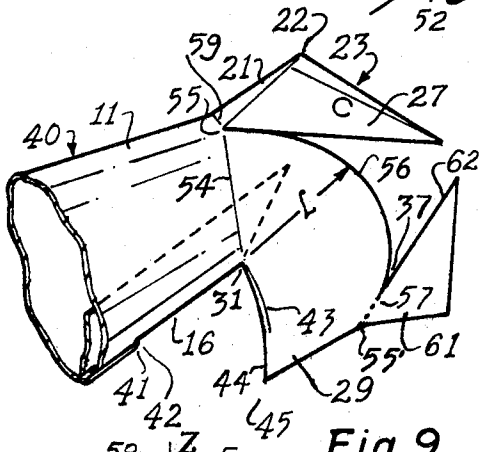


Fig. 9

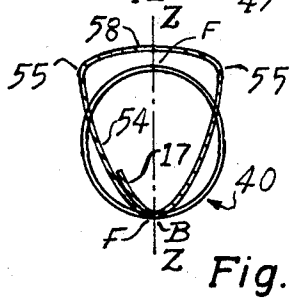


Fig. 8

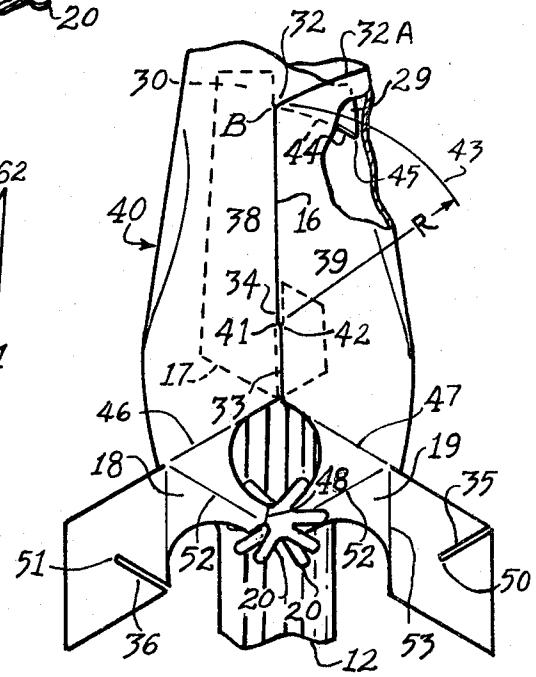


Fig. 3

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June 4, 1968 D. RAZZOLINI 3,386,196

SHEET BLANKS FOR CONSTRUCTION OF THREE-DIMENSIONAL REPRESENTATIONS OF BIRD SPECIES

Filed July 22, 1966 4 Sheets-Sheet 3

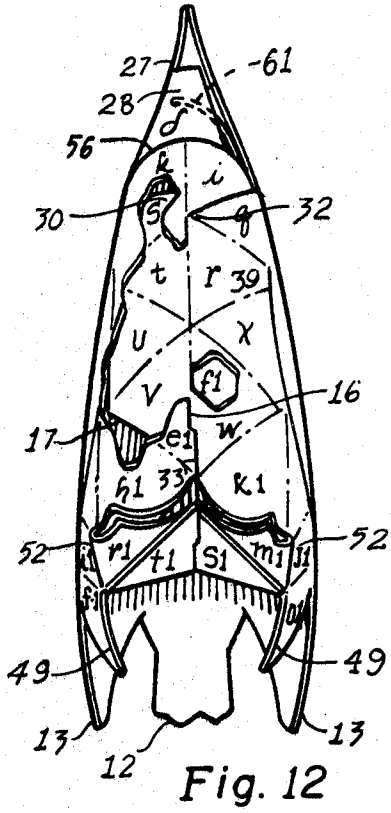


Fig. 12

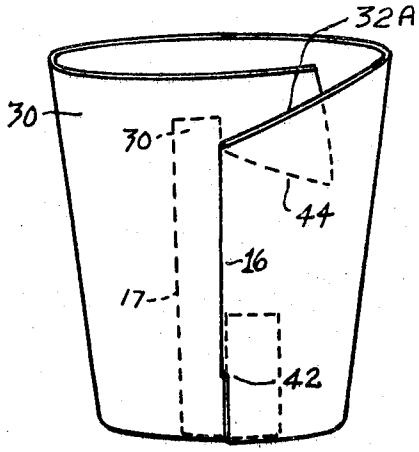


Fig. 5

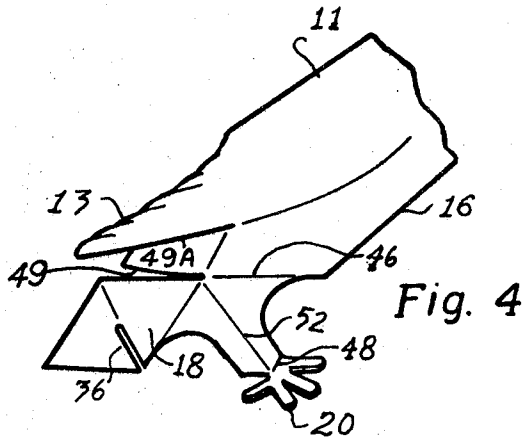


Fig. 4

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SHEET BLANKS FOR CONSTRUCTION OF THREE-DIMENSIONAL REPRESENTATIONS OF BIRD SPECIES

Filed July 22, 1966 4 Sheets-Sheet 4

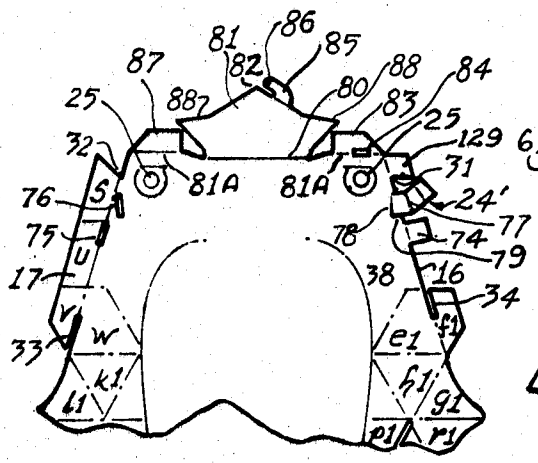


Fig. 20

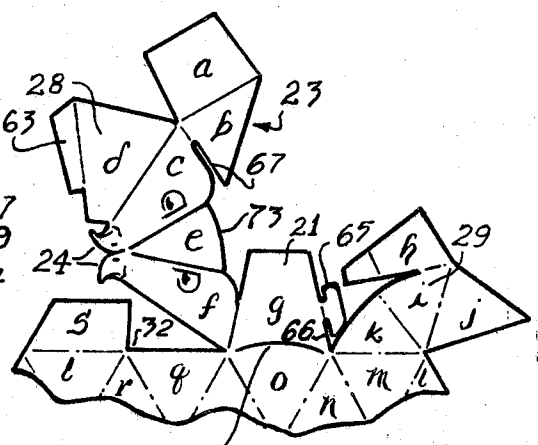


Fig. 18

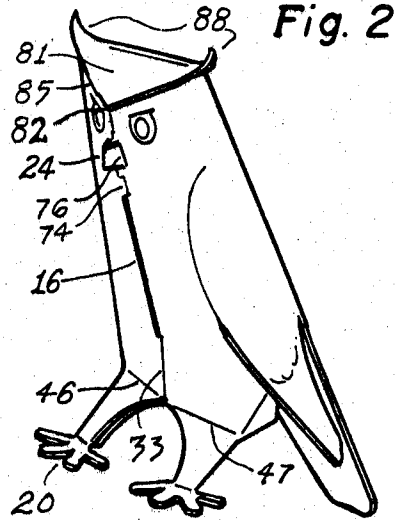


Fig. 21

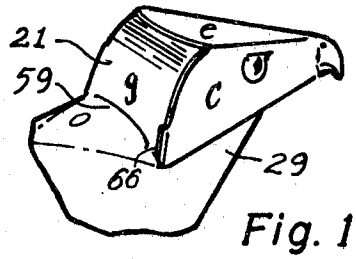


Fig. 19

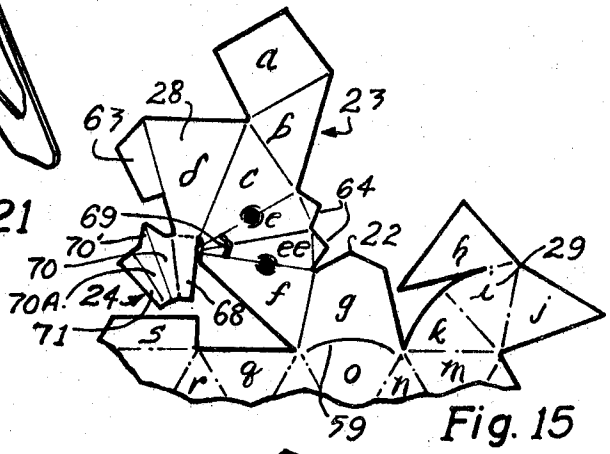


Fig. 15

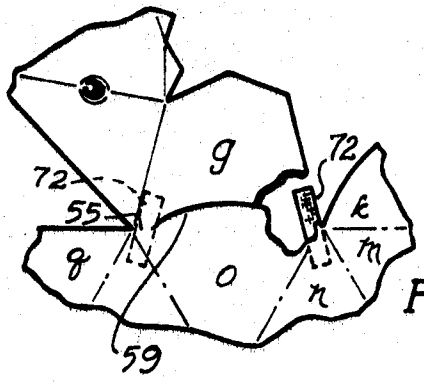


Fig. 17

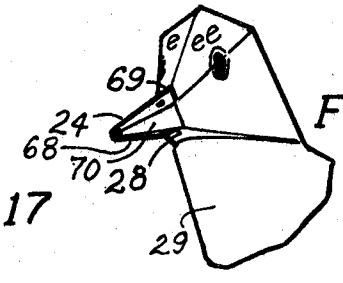


Fig. 16

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United States Patent Office 3,386,196
Patented June 4, 1968

3,386,196

SHEET BLANKS FOR CONSTRUCTION OF THREE-DIMENSIONAL REPRESENTATIONS OF BIRD SPECIES

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Continuation-in-part of application Ser. No. 509,504, Nov. 24, 1965. This application July 22, 1966, Ser. No. 567,227
8 Claims. (Cl. 40—126)

ABSTRACT OF THE DISCLOSURE

A card stock is shaped to outline a blank by a method commencing with establishing a profile of a bird species, superimposing the projection of a cone on the body profile to register along the breast line and the back line with a tail extension and wing flight feather-simulating extensions, defining a sector on the card so that the margins thereof meet along the breast line when rolled to form the cone, superimposing the projection of a conic segment on the throat profile and defining a further sector on the card as an appendage having curved margin and locking flap, and defining a head-forming appendage connected with the back and foldable to form a hollow head shell set in closing relation on the throat segment; defining leg appendages.

This is a continuation-in-part of application Ser. No. 509,504 filed Nov. 24, 1965, in the United States and which is now abandoned.

This invention relates to the construction of short-necked bird specimens as hollow forms made from sheet stock, and to the design and layout of sheet blanks from which three-dimensional shell structures simulating a particular species may be made by a sequence of folding and interlocking manipulations.

The invention is concerned solely with one-piece blanks that require no auxiliary inserts or holding or fastening devices, and the bird models made from such blanks rely for their structural rigidity and integrity solely on the provision of unique interlocking slots and notches carried by the marginal portions and flap extensions of the blank.

Insofar as the kinds of birds that may be realized by the practice of the invention is concerned, this invention is directed only to the relatively shorter-necked species, i.e. those species whose forms are closely approached in models wherein the head is carried on the forward end of the body above a full throat, but lacking a distinct neck column. Such longer-necked species as cranes, swans and most aquatic wading birds are excluded; in general, all land bird forms of the insect-catching and seed-eating species may be realistically approximated by practicing the invention, as well as some birds of prey.

According to my invention, a shell body for a bird is closely representable by providing an enveloping frustum of a first cone formed by joining opposite margins of a sheet blank so that at least one of the margins extends along the keel to the forward terminus thereof, the margins being connected by interlocking spaced slots and notches carried thereby, the frustum having integral rearwardly extending tail and wing primary feather groups, and by rolling a sectoral throat-forming flap integral with the blank into a segment of a cone having its apex on the forward terminus of the keel so as to close the forward end of the frustum when the latter is deformed to a generally triangular cross-section, thereby to form a forwardly-rounded throat of the bird model, the open end of the segment being closed by a contiguous overlying facet of a head shell formed by folding up an integral

head-forming flap of the frustum, and locking of an extension of the throat flap conformably received within the head shell; the shell body being further provided with integral flap portions at the rearward end of the frustum forming the undertail coverts and leg appendages when these flap portions are folded and interlocked, so that the model may stand propped on its legs and on the point of its tail.

Essentially the invention consists in the outline or plan form of a blank or cutout made of a structurally self-supporting sheet stock, provided with a centered longitudinal extension serving as a tail feather group, shorter extensions spaced to each side serving as representations of wing primary feathers, a central back area, side-forming and throat-forming portions extending to either side of the back area, one of the side-forming portions having its outer edge straight and defining the keel edge and the opposite portion having a marginal keel-doubling flap, both side-forming portions having rearward and inward directed projections defining under-tail coverts, and each carrying a slot engageable with the other along the keel line to form a frustum fastening, the portions having respective forward flap and notch portions interengageable with each other adjacent the forward terminus of the keel to hold the keel and sides assembled; the throat-forming flap being sectoral in plan and forming the surface of a conic throat segment having its apex on the terminus of the keel; the head being essentially a multi-sided or faceted shell produced by enfolding a single forwardly extending flap joined with the blank above the nape and having a planar underside, against which the margin of the throat is closely held by a flap secured to the throat flap and engageable within the head against the underside thereof.

According to the invention the rearward projections of the side-forming portions are so shaped as to be foldable along a fold line conforming to the profile of the belly of the bird, and along a second fold line defining the rear margin of the tarsus bone and heel to form doubled-thickness legs standing in realistic representation out of the lower shell body, and being braced thereto by the interlocking of appendages extending transversely from each side of the rearward end of the frustum to form a belly closure.

According to another aspect of the invention, the sheet blank or cutout is further provided with a gap or separation across the nape of the head to permit upward rounding of the nape area and adjacent back area when the forward end of the body-forming frustum is squeezed to give it a triangular outline, while also allowing the back of the head to curve backward and gain greater realism.

The formed structure resulting from the folding and interlocking operations provides a hollow shell-bodied bird-like form having the rearward end essentially closed and braced to resist deformation, the keel interlocked at spaced points and stiffened by a doubling flap along its length, the throat locked by the closing of the generating flap and anchoring within the head shell, and the head shell being enclosed and locked by insertion of a hidden flap within the cheek attached to the throat flap. It will be apparent therefore that the assembled form has structural rigidity and strength to a high degree and that the form will resist ordinary handling and is eminently suitable for displays serving the purposes of teaching, ornamentation and advertising.

The outline and layout of fastening provisions in a sheet blank moreover may be readily carried out to conform the resulting bird form closely to a given bird species, especially when a full-scale side elevation outline

view or photograph of the bird is available as a guide for constructing the geometric forms on which the body and head parts are based.

The invention in its further aspects and details will be better comprehended and understood from a reading of the following description of a preferred embodiment and variants thereof, in conjunction with the accompanying figures of the drawing, in which:

FIGURE 1 is a plan view of the bird-forming card or sheet blank according to the invention;

FIGURE 2 is a perspective view of the bird form constructed from the sheet blank of FIGURE 1;

FIGURE 3 is an illustration of the principles of the keel closure and mode of fastening of margins of a frustum-forming sectoral strip;

FIGURE 4 is an elevation side view of the frustum of FIGURE 3 showing the leg-forming appendages and the manner of folding;

FIGURE 5 shows an alternate frustum similar to that of FIGURE 3, but having opposite conic taper;

FIGURE 6 is a composite side elevation view, showing a Catbird in outline, on which are superimposed the geometric parameters and axes on which the layout of the blank is based;

FIGURE 7 is a side elevation view of the bird form of FIGURE 6 including the frustum and throat cones shown generated on their respective axes;

FIGURE 8 is a cross-sectional view along axis Z—Z of FIGURE 7 transversely of the bird form;

FIGURE 9 is a side elevation view of the assembly of FIGURE 7 showing the throat-forming sector and head-locking flap opened out;

FIGURE 10 is a view of the forward end of the sheet blank of FIGURE 1 illustrating the preliminary assembly of the head-forming flap;

FIGURE 11 is an underside view showing rolling up of the sheet blank to form the body frustum, and showing the preliminary engagement of the keel closure;

FIGURE 12 is the form of FIGURE 11 advanced in assembly to show the final folding of leg appendages and closure of the keel;

FIGURE 13 is an alternate head-forming flap showing crown-locking projections;

FIGURE 14 is a perspective detail of the head assembled from the sheet blank of FIGURE 13;

FIGURE 15 is an alternate head-forming blank portion showing construction of a bill from facets of the underside of the head;

FIGURE 16 is a perspective detail of the assembly made from the head-forming flap of FIGURE 15;

FIGURE 17 is a detail of part of the head-forming flap of FIGURE 1, showing reinforcement of head-attachment portions;

FIGURE 18 is an alternate head-forming portion for a sheet blank showing the layout used for flat-crowned bird heads, such as the falcon;

FIGURE 19 is a partial perspective view of the assembled head portion constructed from the sheet blank of FIGURE 18;

FIGURE 20 is a portion of another bird-forming sheet blank showing the layout for constructing an owl head without using a throat flap or head shell; and,

FIGURE 21 is a perspective view of an owl constructed from the sheet blank of FIGURE 20.

Referring now to the drawing, a bird-forming card or blank is shown in plan in FIGURE 1, having a central back portion **11**, a longtudinally centered rearward extension **12** representing the tail feather group, and respective left and right wing primary feather groups **13** spaced from the tail group. The lateral areas **14** and **15** to the left and right of the back area comprise side side- and belly-forming surfaces, the area **15** having a straight marginal keel-forming edge **16** and the area **14** having a corresponding straight-edged flap portion **17** extending to the margin.

The blank **10** carries further symmetrical rearward left and right extensions **18** and **19** adjacent the side portions **14** and **15** spaced laterally from the back portion and the wing primary feathers, for the purpose of making legs **18A** and **19A**, from each of which project integral foot members **20**, seen in FIGURE 2.

The forward part of the blank **10** comprises a vestigial nape portion **21** projecting centrally forward and having a terminal crown edge **22**, and having a lateral head-forming extension flap **23** of irregular outline, including a projecting bill **24**, eye markings **25**, left and right side faces **26** and **27** of the head, and underside face **28**. Laterally-outwardly extending flap **29** attached to the forward end of the right side portion **15** is a throat closure and cheek interlock, while the corresponding flap **30** forward of the left side portion **14** is a breast-stiffening flap. The junction of the throat flap **29** with the keel edge **16** makes a breast notch **31** of acute angle, while the junction of the breast-stiffening flap **30** with the forward edge **32A** of the blank makes a mating notch **2**.

It can be seen that the blank is provided with five marginal indentations, hereinafter referred to as slots, for effecting interlocking and securing the completed bird form, these comprising left and right rear keel slots **33** and **34** extending in opposite senses and aligned in the directions of respective keel edge **16** and keel flap **17**, and transverse left and right under-covert closure-forming slots **35** and **36** which are generally aligned with each other in the blank and open to the right, and a cheek slot **37** opening to the left from the throat flap **29**. The system of slots and notches, cooperating with the adjacent flaps and projections, as will be described in particular detail hereinafter, suffices to hold the assembled blank in three-dimensional self-sustaining condition but allowing readily of dis-assembly.

Before explaining how a sheet blank is manipulated into its assembled form it will be useful first to explain here the manner in which I designate specific areas and lines shown on the layout of FIGURE 1. The solid lines extending from the perimeter of the blank inwardly into its area show the length and position of incisions which extend completely through the thickness of the sheet blank. The continuous thin straight lines shown within the perimeter of the blank designate the position of fold lines along which the contiguous areas may be bent in or out. The whole surface of the blank is divided by dash-and-dot lines separating triangular sub-areas, these being designated by letter or letter-numeral markings in lower case. Since the manipulation of the sheet blank requires the superposition and matching of specific areas, this mode of referring to the areas provides a precise and easily comprehended reference. Where, for instance, reference is made to a fold line "*f–g*," that signifies the solid line separating areas which respectively contain the letter *f* and the letter *g*; similarly fold line *n*1–*t*1 signifies the fold made between areas marked *n*1 and *t*1. For brevity, the expression "*n*1–*t*1" is to be automatically taken as referring to a fold line as defined for these areas.

In order to aid in the comprehension of the bird form structure to be assembled from the sheet blank of FIGURE 1, it will be advantageous to consider the basic form and its design principles, and the nature of closure means employed, as illustrated in the group of FIGURES 3 to 9 inclusive.

The left and right sheet members **38** and **39** illustrated in the joint of FIGURE 3 are the marginal portions of a sector forming a frustum **40**, the particular cone illustrated having an upwardly decreasing cross-section, although the construction is to be understood as applicable to a cone of any apical angle. The edge **16** of the marginal portion **38** lies along a straight line extending through the apex (not shown) of the cone, and the slot **34** is engaged by slot **33** in the marginal portion **39**, so that the bottoms **41** and **42** of these slots are in contact, and flap portion **17** is covered by the marginal portion **38**.

The arcuate line 43 in flap 29 is generated by a radius arm R centered in the contact point of slot bottoms 41 and 42, and of a length such that the curve intersects the notch points 31 and 32. It is to be noted that the lower marginal edge 44 of flap 29 lies at a lesser radius at all points along the edge than the radius R, except at the notch point B.

The structure of FIGURE 3 is assembled simply by engaging marginal portion 39 with end portion 38 by presenting the slots 33 and 34 in line with flap 17 underneath edge 16, sliding the margins to bring bottoms 41 and 42 in contact, then inserting the point 45 of flap 29 into the notch between flaps 30 and 32A and overcoming the resistance due to binding of edge 44 in the notch until flap 29 is fully behind marginal portion 39. It is to be understood that the amount of interference illustrated has been exaggerated in the interest of clarity, and that it would be much less particularly where the stock is metal or a difficulty-deformable material.

Referring additionally to FIGURE 4, the extensions 18 and 19 of the frustum 40 have their slots 36 and 35 aligned to make equal and opposite acute angles with the keel edge 16, whereas in the flat these were laid out as being aligned at right angles to the centerline of the sheet blank. When the extension 18 is folded up about the line 46, the latter appears in the side elevation view, FIGURE 4, as the outline of the rear belly of the bird, while the appendage is brought into the vertical. The corresponding fold line 47 for extension 19 provides the rear-belly profile on the left side. The belly profile is continued by the shaping of the margin 49 of the rearward part of the frustum, representing the under-tail coverts of the bird form, these being symmetrically aligned at acute angles with the longitudinal centerline of a blank (see FIGURE 1) and narrowing rearwardly.

The leg-forming appendages, when folded along lines 52 generally parallel with slots 35 and 36, provide rigid legs 18A and 19A (see FIGURE 2) in which the fold edges 52 lie along the back of the tarsus bone of the bird, and have their upper termination in a heel point at the junction with belly fold 46 or 47. Further folds 53, symmetrically disposed to register with the belly fold lines 46 and 47, place the slots 35 and 36 into the longitudinal vertical central plane of the frustum, permitting them to be engaged in the manner of carton closures. When these slots are engaged, the legs 18A and 19A hold their doubled form, particularly when the slotted portions are pressed forward into the belly of the bird, to bring the terminal portions of the flaps 18 and 19 into the horizontal and slot bottom 50 bears against slot bottom 51.

It is to be noted that while the keel joint and belly closure has been described for a frustum narrowing forwardly, the same constructional principles will apply to cylinders and to reverse conic frusta such as shown in FIGURE 5.

Referring to FIGURES 6 to 9, the construction of a conic segment to represent a rounded throat will now be described, and the derivation of a layout for a given bird (the Catbird) will be explained. In FIGURE 6, the profile of the bird in side elevation view can be seen to closely conform with a body frustum bounded by lines F, F and having the axis X—X. The lower line F passes through the point B, roughly the forward point of the bird's keel, and along the breast behind this point, or in other words, along the keel. The upper line F passes through the rump and passes through the back under the nape of the bird, for reasons which will be made apparent hereinafter. The throat profile is along the line T passing through point B, and the throat surface will be shown to be closely approximated by the surface of a conic segment that has its apex in B, and its axis in Z—Z passing through point B and the nape. The head may roughly be approximated by a four-sided shell having an underside plane designated by U, left and right side faces W, W, a rear plane V, and a bill line A which is the intersection of side faces W, W.

The axis Z—Z passes through the intersection of planes V and U, at a point above line F. Referring now also to FIGURE 7, wherein is shown the constructional references and the surfaces of geometric forms based on the axes X—X and Z—Z, the line T lies in the surface of a cone whose upper margin 56 lies in the plane U of the head shell, and the frustum 40 generated on axis X—X is joined with the throat cone along the line 54 which is the intersection of a transverse plane including Z—Z.

As will appear from FIGURE 8, the original frustum 40 between lines F, F is a slightly elliptical form in cross-section (unhatched) and on squeezing the end transversely the sides elongate as nearly straight lines 54, merging at junction points 55 with the upper nape surface 58. Point B is assumed to be held steady, as will occur in handling sheet material having a doubled keel of substantial folding.

The junction point 55 establishes the position of the line of intersection of planes V and U, and is in fact the point at which the generally tetrahedral head structure is fixed to the nape at each side of the form. It is also the junction of the throat-forming flap 29 with the nape face 21.

Referring to FIGURE 9, the throat-forming flap 29 will be seen to have a forward margin of elliptical outline, since the plane U intersects the axis Z—Z at an angle other than a right angle. In designing a sheet black for a bird having other relationships of the U plane to the cone axis, the segment will be correspondingly more or less similar to a circle or ellipse, and the form of the flap 29 may be readily laid out by known procedures, employing the views of FIGURES 7 and 8. The flap carries a triangular cheek lock flap 61, so disposed that when the flap 29 is laid on the surface of the throat segment, flap 61 will lie conformably within the head shell, against the left side face 26, identical with right side face 27. The slot 37 formed as a cusp between curve 56 and the flap 61, is actually a result of the fact that the edge 62 of flap 61 defining one side of the slot, is tangent with the extension 57 (dotted) of curve 56 at the point 55', and a sufficient length of material must be provided along the arc 57 to ensure holding.

It will be apparent that the fullness of the throat segment will depend on the length of the curves 56, 57 in relation to the length of the junction lines 54 and the distance between points 55, and that the construction will fit a very wide range of bird profiles. In general, the angle formed between the points 55', 31, and 55 of flap 29 will be less than 180 degrees but more than 90 degrees. It will also be apparent that the axis Z—Z may have any attitude in relation to the keel length, and in general will be inclined so that point B lies forwardly of point 55. As a general rule, the slope of axis Z—Z is chosen by inspecting the profile, specifically the break in the back line where the curve of the head begins, erecting a perpendicular line from point 59 to intersect the U plane, and thus to fix the point 55. The point 59 also locates the incision made across the nape to permit upward bowing of the back, the incision being an upward curve in flap 21 stopping short of points 55.

The head shell formed of flaps 23 is a three-dimensional four-sided hollow shell, in its simplest form, whereof the sides or faces 21, 26, 27 and 28 are formed by adjoining triangular areas connected in sequence. Suitable extensions of one or more of the faces provide a bill 24, as will be described in more detail hereinafter in connection with assembly of a sheet blank. The head shell is susceptible of considerable variation, including rounding or faceting of any or all faces, and changes in relative dimensions and angles, as will be more specifically described in connection with the head variants in the further description.

The sequence of manipulations whereby the sheet blank 10 of FIGURE 1 may be transformed into the

bird form of FIGURE 2 is as follows, proceeding according to the numbered steps:

(1) fold the back of the head (area *g*, or facet **21**) about a line passing through head-attachment zones **55**, toward you;

(2) referring to FIGURE 10, fold the group of head planes or facets *d, c, e, ee* round by folding adjacent facets respectively on *c–d, c–e, e–ee,* and *f–ee* so as to make the undersurfaces of these areas face each other within the head shell formed;

(3) fold *b* down along *b–c* and release;

(4) fold *a* up on *a–b* toward *b* and release;

(5) fold *f* with its attached and prefolded planes round *f–g* and downward, then release;

(6) lay flap *a* in against the underside of the blank under area *o* and lay *b* so it occupies the position contiguous the underside of *g*;

(7) fold chin *d* upward along *d–c* into its position underlying the head, and then fold the chin flap **63** upright inside cheek *f*;

(8) bend down the head flaps **64** along folds *e–64, e–64* to lie against the back of *g*;

(9) turn the whole card upside down and bend it slightly round as by cupping it within the hands, and moving the lateral margins toward each other so that the group of areas *s, t, u, v* and the group *m, l, d*1, *e*1 begin to contact each other; bring the slots **33** and **34** close together;

(10) referring also to FIGURE 11, insert slot **33** fully into slot **34** so that the group of areas *m, l, d*1 and *f*1 lies underneath *w*;

(11) now simultaneously slide *j* underneath *q* and slide flap *h* up into the head between the cheek *f* and the chin *d*, and catch notch point **31** in notch **32**; the head and neck are now formed; using a slender pointed probe, inserted between *f* and *d*, turn the end of flap *h* (**61**) across toward *c*, as in FIGURE 12; the edge **62**, resting against the inside surface of *d*, holds the head and throat locked;

(12) viewing the bird form from beneath, fold *l*1, *m*1, *n*1, *t*1 areas as a group out and away from the form (FIGURE 11) on *k*1–*i*1, and fold group of areas *g*1, *r*1, *s*1, *q*1 on *h*1–*g*1;

(13) fold *m*1 behind *l*1 and fold *r*1 behind *g*1;

(14) slide slot **35** into slot **36** and press lines *s*1–*q*1 and *n*1–*t*1 which are now superimposed, forward gently into the frustum until *r*1 and *g*1 make contact, and *m*1 and *l*1 make contact;

(15) fold *j*1, *o*1, and *p*1, *i*1 in toward each other beneath the wing primary feathers **13** to shape the belly and under-tail coverts; incision **49A** between these areas and wings **13** is opened;

(16) fold foot appendages **20** about lines **43** so that the feet will be flat on a table when the bird stands propped on its tail; this completes the bird form, as a self-supporting structure.

An improved head assembly may be constructed from the alternate head-forming flap **23** of FIGURE 13, which has a further extension **65** adjoining area *g*, and a slot **66** separating part of the extension **65** from *g*; a further slot **67** is cut along *b–c* to partly separate the areas. The assembly of this sheet blank will proceed as given in instructions (1) through (5) above, after which the next step will be:

(17) turn extension **65** forward inside *g*, and swing *e* and *ee* together down about *ee–f* to admit slot **66** downward into slot **67** until the crown flaps **64** are in place adjacent crown **22**; the procedure otherwise will follow previous instructions.

FIGURE 14 shows a head formed from the member of FIGURE 13.

The alternative head-forming flap **23** of FIGURE 15 differs from the forms described only in the arrangement of flap extensions from which the beak **24** is constructed, and is designed to represent species characterized by larger sizes of bills and more forwardly protruding aspect, such as Nuthatches, Vireos, Kingfishers, and Phoebes. The underside flap *d* is extended from its narrow end by a tapering projection **68** which is longer than it is wide. Three flap extensions continue from a side edge of flap **68**, namely **70**, **70A**, and **71**, joined in sequence by their adjacent longer edges, and all tapering together in conformity with the species, but usually narrowing forwardly. A peak or point **70'** projects along the junction of flaps **70** and **70A**. A chevron-shaped slot **69** is pierced at a point along the ridge of the head (line *e–ee*) forwardly of the eyes **25**, into which the peak **70'** is inserted when the flaps **70**, **70A** and **71** are folded up along their joining edges.

FIGURE 16 shows the head produced by forming the member of FIGURE 15.

The junction of head-forming flap **23** with the sheet blank in those designs which require pronounced upward curvature of the nape (area *o*, and surface **58**) is along narrow joint zones adjacent points **55**, lying between the latter and the ends of the incision **59** separating *g* and *o*. The stresses imposed on these joint zones may be better withstood by providing, as in FIGURE 17, strong woven reinforcements **72**, applied to the underside of the sheet blank and suitably adhered thereto.

While the head shells produced from the head-forming members described hereinbefore are suitable for those species characterized by longitudinally ridged or rounded head fronts, the Falcons, and birds of prey generally, have flat crowns which may be represented more accurately by the head-shell forming member of FIGURE 18. This member further includes, in addition to the elements of FIGURE 13, partial separation along *f–g* and along *b–c*, as a result of forming *f* and *c* with rounded corners, and also a longer flap *g*; the crown comprises the single flat facet *e*, and has a slightly convex rear edge **73**. Proceeding according to the forming operations given previously for FIGURE 13, the flap *g* is finally inserted forwardly to lie under the edge **73**, thereby providing, as shown in FIGURE 19, a well-rounded back-of-the-head form, and a fully locked head shell without gaps.

Three-dimensional representations of members of the owl family may also be constructed according to the principles of the invention as set out hereinbefore, with the modification that the throat segment is omitted, no head shell is required, and the upper end of the frustum is truncated to form a very broad head with rounded crown, by a curved surface generated by a line which moves parallel with a fixed transverse line.

Referring to FIGURES 20 and 21, sheet blank **10** includes, in addition to the frustum-forming elements below the head as previously described, a greatly elongate keel line **16**, which is nearly the full length of the body, and further closure means is provided therefor comprised of the intermediate flap extension **74** and mating aperture **75**, respectively protruding from keel edge **16** and pierced in keel flap **17**. The notches **31** and **32** are engaged as in sheet blanks previously described to form a frustum closure, except that only a vestigial flap **129** is provided to define the notch **31** instead of the sectoral flap **29**.

The beak **24** projects in the assembled owl from an aperture **76** pierced in marginal portion **39** at a point located inwardly of and between the aperture **75** and notch point **32**, and is formed by folding flap **24'**, which is symmetrically disposed from the aperture **76** in marginal portion **38**, along a ridge line **77** to form a blunt beak point. The flap **24'** is bent out from the marginal portion **38** along a fold line **78** inclined to the keel line **16** so that the underside of the beak **24** is wider and projects further out than the top edge.

The end of the frustum is closed by a centrally located and pointed crown flap **81** folded about transverse line **80** and extending forward in an upwardly convex curve to fit the point **82** upon the upper keel extremity. A pair of smaller flaps **83** and **87**, spaced to the right and left respectively of flap **81**, are foldable along lines **81A** to de-

fine the upper edges of the terminal portion of the frustum forming the forehead above the eyes 25. As the crown flap is closed, the locking flap 85 located on its right forward edge is inserted to bring the end 86 through an elongate aperture 84 pierced along fold line 81A of flap 83, to form the frustum closure. Pointed projections 88 are provided on the crown flap to stand out and are upturned to represent ear appendages for certain owls having such feature.

The manipulations carried out during the forming sequence, involving interfitting of various flaps, slots and notches, serve as exercises useful for developing dexterity and coordination of the hands, and would provide therapy. The handling of many different species-forming blanks, while being in the guise of play or artwork, will lead easily to ornithological knowledge, particularly when the opportunity is provided of completing the markings and colorations. Bird forms constructed as described may also be used as decoys.

I claim:

1. The method of shaping the outline of a blank of sheet material intended for forming into a self-sustaining hollow shell conforming closely to the body of a bird species, which comprises the steps of:

(1) providing a side elevation profile view of a species of bird;

(2) establishing the outline of an enveloping cone upon said profile view having its axis centered on the body of said bird and having the lower outline registered along the belly profile;

(3) establishing the outline of a conic segment having one side lying along the throat profile and its axis intersecting the axis of the body cone in the forward terminus of the keel; and,

(4) laying out said blank to define a body cone-forming sectoral portion having forward and rearward extensions and side margins such that when said sectoral portion is rolled and said side margins are joined an open-ended conic shell is formed, the side elevation projection of which conforms with the body profile of said bird and also to define a forward extension of said sectoral portion as an integral flap having a forward curved margin and having a lateral extension such that when said flap is rolled into a conic segment said lateral extension may be joined with an opposite side of said conic shell to form a throat closure.

2. The method of claim 1 which includes the step of defining an integral forwardly-extending head-forming flap and providing a series of angularly related fold lines such that said flap may be folded to form a faceted hollow head closing said conic shell and disposed contiguous with said curved margin.

3. The method of claim 1 wherein said lateral extension is joined with said conic shell after the forward portion of said shell has been deformed to bulge the back profile upwardly and to shape the forward end as a generally triangular outline.

4. The method of claim 3 wherein said blank is provided with back markings along a central zone of said sectoral portion and is provided with complementary wing feather markings adjacent said side margins and with integral rearward extensions such that when said blank is rolled to form said conic shell said rearward extensions conform with the profiles of the tail and wing primary flight feathers.

5. The method of claim 4 wherein said blank is further shaped to provide rearward integral extensions such that on folding along a line projectable as an extension of the breast profile, upright legs are formed so that conic shell may be propped in inclined standing body attitude resting on said legs and the point of said tail extension.

6. In a structure resembling the body of a bird formed from a blank of semi-rigid sheet material foldable to provide a self-supporting hollow figure, areas of said blank comprising a central back portion, left and right wing-feathering portions, a forward nape appendage, a rearward tail-feathering appendage, a throat closure flap, and lateral leg forming appendages, the construction of said blank having,

first and second side flap portions located on opposite sides of said central back portion,

said throat closure flap disposed adjacent one side of said nape appendage and shaped as a sector having a side edge defining a rearwardly-opening notch spaced forwardly of said second side flap portion,

said sector centered on said rearwardly-opening notch,

said first side flap portion having a rearwardly-opening slot and a forwardly-opening notch and said second side flap portion having a forwardly-opening slot,

said slots spaced rearwardly along a keel line from respective notches and adapted to be interlocked to secure the rearward end of the keel when said back, wing-feathering, and side flap portions of said blank are rolled about an axis to form a hollow open-ended body frustum,

said notches interlocking to define the forward limit of the keel in their intersection, and

said throat-closure flap adapted when bent as an upwardly-opening conic segment having its apex in said intersection to join said side edge contiguously along the forward open end of said body frustum when said end is deformed to a triangular cross-section to close said open end in simulation of the bird throat.

7. A structure as set forth in claim 6 wherein said first side flap portion of said blank lies under the second side flap portion in said body frustum and said leg-forming appendages are foldable about respective midlines along their lengths and along a hinge line in the profile of said body frustum to extend said legs downwardly and forwardly from the rearward end of said body frustum into an erect stance, and said blank further comprises slotted rearward appendages carried by said leg-forming appendages adapted to be folded forwardly inside said body frustum and to interlock with each other to brace said legs.

8. A structure as set forth in claim 6 wherein said nape appendage carries a flap foldable to form a head shell and wherein said nape appendage is transversely incised forwardly of said central back portion and is bent outwardly, said incision being arcuate forwardly and the ends thereof terminating short of the side edges of said nape appendage to provide a pair of spaced attachment zones with the blank whereby said nape and the forward end of said body frustum merge along a convexly rounded line of intersection.

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